DOCUMENT RESUME

ED 202 450 IR 009 198

AUTHOR	Marshall, Patricia; And Others
TITLE	Instructional Computing in Minority Institutions: A Needs/Strategy Assessment. Final Technical Report of Evaluation.
INSTITUTION	Xavier Univ. of Louisiana, New Orleans.
SPONS AGENCY	National Science Foundation, Washington, D.C.
PUB DATE	Dec 80
GRANT	NSF-SPI-7821515
NOTE	1,085p.
EDRS PRICE	MF08/PC44 Plus Postage.
DESCRIPTORS	*Computer Assisted Instruction; *Computer Managed Instruction; *Computer Science Education; Conferences; Degrees (Academic); Educational Objectives; Formative Evaluation; Higher Education; Interviews; *Minority Groups; *Needs Assessment; Questionnaires; Resource Allocation; Surveys; Tables (Data)

ABSTRACT

Designated as Appendices C-G, the five reports in this collection complete the final report of a survey of 239 minority colleges and universities which was conducted to determine both the current status and the desired status of instructional computing at these schools. The executive summary (see related document) includes Appendices A and B--Computer Education Goals at Minority Institutions of Higher Education by Arthur Luehrmann, and Strategies for Improvement of Educational Computing at Minority Institutions by Judith B. Edwards. The five reports in this volume are (1) Access to Computing Resources at Minority Colleges and Universities, by Donald L. Alderman; (2) Academic Computing in Minority Colleges and Universities, by Richard M. Jaeger; (3) The Impact of Conferences on Educational Computing for Minority Colleges and Universities, by Thomas J. McAlpine and Donald L. Alderman; (4) Interviews on Academic Computing Conducted at Selected Minority Campuses, by Hugh Poynor and Thomas W. Mason; and (5) Objectives for Educational Computing at Minority Institutions, by Hugh Poynor. Each report provides an analysis of the data relevant to one facet of the study and a discussion of the results. Some questionnaires are included. (BK)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED202450

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

INSTRUCTIONAL COMPUTING IN MINORITY INSTITUTIONS: A NEEDS/STRATEGY ASSESSMENT

FINAL TECHNICAL REPORT
OF EVALUATION SUPPORTED BY
NATIONAL SCIENCE FOUNDATION GRANT NO. SPI 7821515

PRINCIPAL INVESTIGATOR: SISTER PATRICIA MARSHALL
XAVIER UNIVERSITY OF LOUISIANA
NEW ORLEANS, LOUISIANA 70125

EVALUATORS: DONALD L. ALDERMAN
JUDITH B. EDWARDS
RICHARD M. JAEGER
ARTHUR LUEHRMANN
THOMAS J. MCALPINE
HUGH POYNOR

SUBMITTED: DECEMBER, 1980

OPINIONS STATED IN THIS REPORT ARE THOSE OF THE AUTHOR AND/OR EVALUATORS AND DO NOT NECESSARILY REPRESENT THE POSITION OR POLICY OF THE NATIONAL SCIENCE FOUNDATION.

IR009198

TABLE OF CONTENTS

TITLE PAGE

TABLE OF CONTENTS

LETTER OF TRANSMITTAL

EXECUTIVE SUMMARY (IN BOOKLET FORM)

APPENDIX A* (INCLUDED WITH EXECUTIVE SUMMARY, PP. 18-22):

COMPUTER EDUCATION GOALS AT MINORITY INSTITUTIONS OF HIGHER EDUCATION -- ARTHUR LUEHRMANN

APPENDIX B* (INCLUDED WITH EXECUTIVE SUMMARY, PP. 23-28):

STRATEGIES FOR IMPROVEMENT OF EDUCATIONAL COMPUTING IN MINORITY INSTITUTIONS -- JUDITH B. EDWARDS

APPENDIX C (FICHE** ANALYSIS):

ACCESS TO COMPUTING RESOURCES AT MINORITY COLLEGES AND UNIVERSITIES -- DONALD L. ALDERMAN

APPENDIX D (QUESTIONNAIRE SURVEY):

ACADEMIC COMPUTING IN MINORITY COLLEGES AND UNIVERSITIES -- RICHARD M. JAEGER

APPENDIX E (ECMI*** CONFERENCE EVALUATION):

THE IMPACT OF CONFERENCES ON EDUCATIONAL COMPUTING FOR MINORITY COLLEGES AND UNIVERSITIES -- THOMAS J. MCALPINE AND DONALD L. ALDERMAN

APPENDIX F (ON-SITE CAMPUS INTERVIEWS):

INTERVIEWS ON ACADEMIC COMPUTING CONDUCTED AT SELECTED MINORITY CAMPUSES -- HUGH POYNOR, DESIGNER, AND THOMAS W. MASON, SUMMARIZER

APPENDIX G (OBJECTIVES):

OBJECTIVES FOR EDUCATIONAL COMPUTING AT MINORITY INSTITUTIONS -- HUGH POYNOR

---

* STRATEGIES

** FICHE: FOURTH INVENTORY OF COMPUTERS IN HIGHER EDUCATION

*** ECMI: EDUCATIONAL COMPUTING IN MINORITY INSTITUTIONS

APPENDIX A

STRATEGY ASSESSMENT

COMPUTER EDUCATION GOALS AT MINORITY INSTITUTIONS OF HIGHER LEARNING

ARTHUR LUEHRMANN
DIRECTOR OF COMPUTER RESEARCH
LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA
BERKELEY, CA 94720

NOTE: THIS APPENDIX IS INCLUDED WITH THE EXECUTIVE SUMMARY ON PAGES 18-22. IT IS NOT REPEATED HERE.

APPENDIX B

STRATEGY ASSESSMENT

STRATEGIES FOR IMPROVEMENT OF EDUCATIONAL COMPUTING IN MINORITY INSTITUTIONS

JUDITH B. EDWARDS
NORTHWEST REGIONAL EDUCATION LABORATORY
400 LINDSAY BUILDING
710 S. W. 2ND AVENUE
PORTLAND, OR 97204

NOTE: THIS APPENDIX IS INCLUDED WITH THE EXECUTIVE SUMMARY ON PAGES 23-28. IT IS NOT REPEATED HERE.

APPENDIX C

FICHE ANALYSIS

(FOURTH INVENTORY OF COMPUTERS
IN HIGHER EDUCATION)

ACCESS TO COMPUTING RESOURCES AT MINORITY COLLEGES AND UNIVERSITIES

DONALD L. ALDERMAN
EDUCATIONAL TESTING SERVICE
PRINCETON, NJ 08540

Access to Computing Resources at Minority Colleges and Universities

Donald L. Alderman

Educational Testing Service

Princeton, New Jersey 08541

February 1980

This report is based upon work supported by the National Science Foundation under Grant Number SPI-78-21515, Sister Patricia Marshall, Xavier University of Louisiana, Principal Investigator. Any opinions, findings, and conclusions are those of the author and do not necessarily reflect the views of the National Science Foundation.

Acknowledgments

This report is one component of a project assessing the needs of minority institutions in educational computing. Sister Patricia Marshall, Xavier University of Louisiana, is the principal investigator for the project, funded by the National Science Foundation through Grant Number SPI-78-21515. Prof. John W. Hamblen, University of Missouri-Rolla, provided summaries from his fourth inventory of computers in higher education, and these summaries led to the present report. Both of these individuals deserve recognition as each really made a greater contribution to this report than the author. However, the findings presented and opinions expressed in the text which follows remain the responsibility of the author alone.

Contents

Page

Acknowledgments ii

Summary iv

Introduction 1

Purpose 2

Procedures 2

Results and Discussion 3

  Sample 3
  Degree Programs and Productivity 8
  Access to Computers 11
  Computer Uses and Applications 15
  Staff for Degree Programs and Costs for Computer Installations 20

Conclusions 26

Summary

Colleges and universities responding to the fourth inventory of computers in higher education were designated as minority or non-minority institutions dependent on whether a majority of their student enrollment came from certain racial and national origin groups. Summaries of information on computer access and applications at these institutions as well as on their degree programs related to computer science provided a basis for examining the relative needs of minority colleges and universities with regard to academic computing. The major findings were:

- Minority colleges and universities offer only a small number of degree programs in computer science and related fields and, therefore, award a very low number of such degrees each year. The disparity between minority and non-minority institutions in this respect far exceeds their proportional numbers of institutions and their proportional representation in the population. Especially at the baccalaureate and master's degree levels there is a need to initiate and to expand degree programs in computer science and related fields at minority institutions.

- Seventy percent of minority colleges and universities had access to computing resources and sixty-eight percent of non-minority colleges and universities had access to computing resources. Despite their smaller student enrollments and lower degree programs, minority institutions have computers to the same extent that non-minority institutions do.

- Computer installations dedicated to specific applications in administration, instruction, and research show much the same pattern of computer use in both minority and non-minority institutions. There is also a similar pattern in the frequencies with which minority and non-minority institutions offer particular programming languages. Furthermore, comparable percentages of minority and non-minority institutions support remote modes of computing and interactive computing.

- It would appear that students at minority institutions do not receive as much exposure to computers in their academic studies as do students at non-minority institutions. Although differences in student enrollments and in degree programs account for some of the disparity in the total numbers of students using computers in their courses, minority colleges and universities reported only one-fortieth the total number of students with exposure to computers in academic courses reported by non-minority colleges and universities.

- The 105 minority institutions responding to the survey reported a total of 35 full-time faculty members with doctorates in computer science or related degree programs; the 1,707 non-minority institutions reported nearly 1,800 such faculty members. The under-representation of certain minorities in the computer-related professions may be attributed, in part, to the scarcity of appropriate degree programs at minority institutions; and the scarcity of such degree programs may, in turn, be due to a lack of key faculty members.

- Small baccalaureate minority colleges, those with an enrollment of 500-2,499 students, spent more on their computer installations than did comparable non-minority institutions. The greater average expenditure of these minority institutions arose primarily from capital costs for computer hardware and from operating costs from software services. These cost categories would be consistent with acquisition of computer equipment and with expansion of support services, perhaps indicative of recent entry into the computer field.

These findings suggest that the initiation and expansion of degree programs in computer science and in related fields receive the highest priority for attention at minority colleges and universities. Concomitant with this attention to curriculum programs should come concerted efforts to recruit faculty members in these disciplines. The under-representation of certain minorities in the computer professions seems less a problem of access to computing resources than of access to relevant degree programs and faculty members.

Introduction

This report is part of a broader assessment of the needs of minority colleges and universities with respect to educational computing. The focus here is on access to computing resources at minority institutions and on applications of these resources. A comparative approach to the dual problems of access and applications has been taken in examining the status of computing at minority institutions: contrasts will be drawn between minority colleges and universities and non-minority colleges and universities.

A college or university was designated as a minority institution if a majority of its student enrollment represented the following racial and national origin groups: Alaskan Indian, American Indian, Black, Eskimo and Hispanic. Each of these groups has a lower percentage of persons in the sciences than it has in the general population, and in this sense these groups may be viewed as under-represented in the sciences. All other colleges and universities, whether none or half of their students came from these same groups, were designated as non-minority institutions. Thus, the contrasts between the two types of institutions reflect an artificial dichotomy subject to change as enrollment patterns at particular institutions change. And the classification of an institution based on its student body would not necessarily be the same if classification instead depended on minority representation among its faculty.

An existing data base provided information on computer access and use at minority and non-minority institutions. Hamblen's series of inventories of computers in higher education represents the most comprehensive source available on computing in colleges and universities, and the data base from the fourth such inventory[1] was made available for these analyses. The fourth inventory was conducted in June 1977 and reflects the status of computing in higher education at that time. The present report extends the original summaries and analyses by considering minority and non-minority institutions separately and by offering comments on the status of computing according to this distinction.

---

[1] John W. Hamblen and Thomas B. Baird (Eds.). Fourth Inventory of Computers in U.S. Higher Education 1976-77. Princeton, N.J.: EDUCOM, 1979.

Purpose

This report examines four aspects of educational computing at minority institutions: (1) degree programs related to computers and the productivity of these programs; (2) access to computers; (3) use of computers, especially applications in courses; and (4) staff for degree programs related to computer science and costs for computer installations. Degree programs and productivity in computer science and related disciplines depend heavily on an institution's computing resources, and modern computer facilities certainly enhance studies in these fields. Access to computers is essential in some programs, such as data processing in community colleges and computer science in universities, important in other programs, such as mathematics and statistics, and beneficial in all programs given the expanding role of computers in society. Furthermore, faculty and student researchers in the sciences rely heavily on computers in the conduct of their work. The nature of computer uses, whether administrative, instructional, research or some combination, reflects the manner in which academic institutions harness computer capabilities; and patterns of computer applications in specific courses can reveal particular weaknesses or strengths at minority institutions. Finally, staffing and costs represent two areas where Federal intervention can exert a direct influence on computing resources.

Procedures

The fourth inventory of computers in higher education was a survey of 3,136 colleges and universities in the United States. Each institution received four forms eliciting information on its computing resources, applications and degree programs. The first form dealt with expenditures on computing, sources of income for computing activities, staffing for computer installations, and computer equipment. The second form covered instructional and research uses of computers by academic fields within the sciences. The third form concentrated on courses and degree programs related to computer science. And the fourth form focused on administrative applications of the computer.

The richness of the full data base resulting from the survey is evident from the original report. The summaries alone run several hundred pages. Since the same summaries for both minority and non-minority institutions constituted the input to this brief examination of computing resources at minority colleges and universities, much of the original detail has been omitted in arriving at an overview. Listings of computers, of specific courses, of administrative applications, and of institutions and installations do not appear here. Moreover, few tables included here retain the elaborate classification system for institutions devised for the inventory. The central objectives for this report were to simplify the extensive data base and to present an overview of computing resources at minority colleges and universities in relation to their non-minority counterparts.

Results and Discussion

Sample. Table 1 shows the number of colleges and universities that received the fourth inventory of computers in higher education and the number that responded.[2] There were 202 minority institutions in the sample and 105 completed

---

[2] These figures differ slightly from those reported by Hamblen & Baird since 11 branches of the University of Hawaii system and two other colleges in Hawaii eligible for minority designation were excluded from the sample. These institutions voluntarily declined participation in the belief that their inclusion would distort the results. Furthermore, the classification of three colleges was changed to minority because they had heavy Micronesian and Polynesian enrollments. But the change occurred at a late stage in the project so these three colleges were also included among the 2,908 non-minority institutions under the assumption that the three colleges, which had responded only to the first form of the survey, would not distort the overall picture of non-minority institutions.

Total Enrollment	Support	Highest Degree Program	Minority Institutions Total Sample	Minority Institutions Number of Responses	Minority Institutions Response Rate (%)	Non-minority Institutions Total Sample	Non-minority Institutions Number of Responses	Non-minority Institutions Response Rate (%)
<500	Public	Associate	1	1	100	51	27	53
		Bachelor's	0	0	-	4	2	50
		Master's	0	0	-	11	6	55
		Doctorate	0	0	-	2	1	50
		Total	1	1	100	68	36	53
	Private	Associate	18	9	50	142	91	64
		Bachelor's	9	6	67	212	111	52
		Master's	0	0	-	137	90	66
		Doctorate	1	1	100	72	47	65
		Total	28	16	57	563	339	60
	Both	Associate	19	10	53	193	118	61
		Bachelor's	9	6	67	216	113	52
		Master's	0	0	-	148	96	65
		Doctorate	1	1	100	74	48	65
		Total	29	17	59	631	375	59
500-2,499	Public	Associate	19	8	42	422	240	57
		Bachelor's	11	7	64	42	26	62
		Master's	6	3	50	33	19	58
		Doctorate	0	0	-	28	18	64
		Total	36	18	50	525	303	58
	Private	Associate	8	5	62	81	43	53
		Bachelor's	42	20	48	411	249	61
		Master's	6	2	33	212	104	49
		Doctorate	2	1	50	42	27	64
		Total	58	28	48	746	423	57
	Both	Associate	27	13	48	503	283	56
		Bachelor's	53	27	51	453	275	61
		Master's	12	5	42	245	123	50
		Doctorate	2	1	50	70	45	64
		Total	94	46	49	1,271	726	57

Table 1-A

Survey Sample and Response Rate

Total Enrollment	Support	Highest Degree Program	Minority Institutions Total Sample	Minority Institutions Number of Responses	Minority Institutions Response Rate (%)	Non-minority Institutions Total Sample	Non-minority Institutions Number of Responses	Non-minority Institutions Response Rate (%)
2,500-9,999	Public	Associate	22	9	41	307	159	52
		Bachelor's	6	5	83	29	19	66
		Master's	25	15	60	145	85	59
		Doctorate	2	2	100	41	32	78
		Total	55	31	56	522	295	57
	Private	Associate	3	1	33	5	3	60
		Bachelor's	1	1	100	23	10	43
		Master's	8	5	62	81	55	68
		Doctorate	1	1	100	70	38	54
		Total	13	8	62	179	106	59
	Both	Associate	25	10	40	312	162	52
		Bachelor's	7	6	86	52	29	56
		Master's	33	20	61	226	140	62
		Doctorate	3	3	100	111	70	63
		Total	68	39	57	701	401	57
10,000-19,999	Public	Associate	9	3	33	73	26	36
		Bachelor's	0	0	-	2	1	50
		Master's	0	0	-	37	29	78
		Doctorate	0	0	-	63	47	75
		Total	9	3	33	175	113	65
	Private	Associate	0	0	-	0	0	-
		Bachelor's	0	0	-	0	0	-
		Master's	0	0	-	3	3	100
		Doctorate	0	0	-	18	12	67
		Total	0	0	-	21	15	71
	Both	Associate	9	3	33	73	26	36
		Bachelor's	0	0	-	2	1	50
		Master's	0	0	-	40	32	80
		Doctorate	0	0	-	81	59	73
		Total	9	3	33	196	128	65

Table 1-B

Survey Sample and Response Rate

			Minority Institutions			Non-minority Institutions		
Enrollment	Support	Highest Degree Program	Total Sample	Number of Responses	Response Rate (%)	Total Sample	Number of Responses	Response Rate (%)
<20,000	Public	Associate	1	0	0	22	17	77
		Bachelor's	0	0	–	0	0	–
		Master's	0	0	–	9	3	33
		Doctorate	1	0	0	69	52	75
		Total	2	0	0	100	72	72
	Private	Associate	0	0	–	0	0	–
		Bachelor's	0	0	–	0	0	–
		Master's	0	0	–	0	0	–
		Doctorate	0	0	–	9	5	56
		Total	0	0	–	9	5	56
	Both	Associate	1	0	0	22	17	77
		Bachelor's	0	0	–	0	0	–
		Master's	0	0	–	9	3	33
		Doctorate	1	0	0	78	57	73
		Total	2	0	0	109	77	71
Across Enrollments	Public	Associate	52	21	40	875	479	55
		Bachelor's	17	12	71	77	48	62
		Master's	31	18	58	235	142	60
		Doctorate	3	2	67	203	150	74
		Total	103	53	51	1,390	819	59
	Private	Associate	29	15	52	228	137	60
		Bachelor's	52	27	52	646	370	57
		Master's	14	7	50	433	252	58
		Doctorate	4	3	75	211	129	61
		Total	99	52	53	1,518	888	58
	Both	Associate	81	36	44	1,103	616	56
		Bachelor's	69	39	57	723	418	58
		Master's	45	25	56	668	394	59
		Doctorate	7	5	71	414	279	67
		Total	202	105	52	2,908	1,707	59

Table 1-C

Survey Sample and Response Rate

at least one form in the survey, for a 52% response rate. Of 2,908 non-minority institutions there were 1,707 respondents for a 59% response rate. The difference in response rates stemmed primarily from the lower frequency of replies evident among minority community colleges. With such low response rates it would be inappropriate to extrapolate from responding institutions to the total population of colleges and universities, especially in the absence of any independent confirmation of the similarity of respondents and non-respondents. Analyses and observations offered here, therefore, refer just to the sample of institutions for which data were available. Inferences to all minority and non-minority institutions should be made with caution.

Aside from response rates Table 1 reveals some notable imbalances between minority and non-minority institutions. There were 305 non-minority colleges and universities which enrolled 10,000 or more students (i.e., 196 institutions with 10,000-19,999 students and 109 institutions with 20,000 or more students); there were only eleven minority institutions of comparable size and ten of these were community colleges. Furthermore, there were just seven minority universities granting doctorate degrees while there were 414 non-minority universities awarding the same degree. Although there may be acceptable explanations for these discrepancies arising from historical enrollment patterns and efficient use of resources in higher education, they do affect contrasts between minority and non-minority institutions.

Larger enrollments and higher degree programs often mean greater awareness and more widespread use of computing resources. Since a larger number and a larger proportion of non-minority institutions came from these categories, analyses should show minority institutions to be at a disadvantage with respect to computer access and applications. This expectation receives additional weight when the above-average response rates from large non-minority institutions (i.e., a 65% response rate from non-minority institutions with 10,000-19,999 students and a 71% response rate from non-minority institutions with over 19,999 students) and doctoral degree non-minority institutions (i.e., a 67% response rate) are taken into consideration. Indeed, the non-minority institutions with large enrollments tend to be those which offer the doctorate degree.

Degree Programs and Productivity. The numbers of minority and non-minority institutions that have degree programs in computer science and related fields appear in Table 2. Among the 105 minority institutions responding to the survey there were 18 community colleges of 36 responding that had an associate degree program related to computer science, primarily in data processing, 14 colleges with bachelor's degree programs in fields associated with computers, three institutions with master's degree programs, and no doctoral degree programs in any discipline closely linked with computer science. Among the 1,707 non-minority institutions responding to the survey there were 325 associate degree programs, 326 bachelor's degree programs, 145 master's degree programs and 73 doctoral degree programs in computer science and related fields.

The consequences of these marked differences in degree programs become evident in the numbers of students receiving degrees in computer science and related fields from minority and non-minority institutions. Table 3 gives the estimated numbers of graduates by degree level and field for both minority and non-minority institutions. While minority colleges projected 336 recipients of an associate degree in computer science and related fields for the 1977-78 academic year, non-minority colleges projected 5,557 such degrees. And minority respondents projected only 145 bachelor's degrees associated with computer science although there were to be 6,940 bachelor's degrees from non-minority institutions responding to the survey. At the master's degree

	Minority Institutions				Non-minority Institutions			
	Number of Degree Programs by Level (1978-79)				Number of Degree Programs by Level (1978-79)			
Degree Program	Associate	Bachelor's	Master's	Doctorate	Associate	Bachelor's	Master's	Doctorate
Computer Engineering					2	9	7	4
Computer & Information Science					2	5	2	1
Computer Programming	2	0	0	0	35	4	1	0
Computer Science	3	9	3	0	61	190	90	43
Computer Science & Engineering					1	9	9	6
Computer Science Technology					9	3	1	0
Computer Technology					12	1	0	0
Data Processing	11	1	0	0	182	27	2	1
Information & Computer Science					2	5	2	2
Information Science					1	9	3	2
Information Systems	1	2	0	0	4	22	10	5
Mathematical Sciences					0	1	0	0
Systems Analysis					1	1	0	0
Statistics & Computer Science					0	1	1	0
Systems Engineering					0	1	2	0
Systems & Information Science					0	2	1	1
Systems					0	1	2	0
Other	1	2	0	0	13	35	12	8
Total	18	14	3	0	325	326	145	73

Table 2

Science Degree Programs

	Minority Institutions				Non-minority Institutions			
	Number of Degrees (1977-78)				Number of Degrees (1977-78)			
Degree Program	Associate	Bachelor's	Master's	Doctorate	Associate	Bachelor's	Master's	Doctorate
Computer Engineering					8	137	56	9
Computer & Information Science					10	154	78	14
Computer Programming	56	0	0	0	641	36	0	0
Computer Science	26	84	23	0	735	4,243	1,251	185
Computer Science & Engineering					5	299	187	26
Computer Science Technology					140	65	40	0
Computer Technology					213	7	0	0
Data Processing	209	9	0	0	3,522	625	21	1
Information & Computer Science					25	209	63	4
Information Science					0	90	138	6
Information Systems	5	40	0	0	94	392	131	15
Mathematical Sciences					0	0	19	0
Systems Analysis					5	99	0	0
Statistics & Computer Science					0	50	0	0
Systems Engineering					0	20	19	0
Systems & Information Science					0	70	3	2
Systems Sciences					0	75	4	0
Other	40	12	0	0	159	369	129	15
Total	336	145	23	0	5,557	6,940	2,139	277

Table 3

Science Degree Graduates

level minority institutions projected awarding barely one one-hundredth of the number of degrees to be given at non-minority institutions, 23 versus 2,139. Consistent with the fact that no minority institution reported a doctoral degree program in computer science or related fields, there were no such degrees given from minority institutions in the 1977-78 academic year.

The under-representation of certain racial and national origin groups in the computer professions is understandable given the scarcity of relevant degree programs and the paucity of graduates in computer science and related fields at minority institutions. Especially at the bachelor's and master's levels there seems to be a need to strengthen and expand existing curriculum programs and to initiate new curriculum programs in computer science and related fields at minority institutions if this imbalance is to be alleviated through higher education. Alternatively, non-minority institutions could provide incentives to attract minority graduate degree candidates to these fields of study. The extent of the imbalance may suggest both initiatives.

Access to Computers. The numbers of colleges and universities reporting computer installations in the fourth inventory of computers in higher education appear in Table 4. The access rate given in this table is simply the percentage of institutions in a given classification with computing resources. Despite the expectation that larger non-minority institutions with higher degree programs would lead to a higher access rate among non-minority institutions, the overall access rate for minority institutions was 70% as compared to a 68% access rate for non-minority institutions. Yet the access rate was high relative to the average for larger non-minority institutions with higher degree programs: 92% at institutions with 10,000-19,999 students and 94% at institutions with over 19,999 students; 78% at universities granting the doctoral degree.

			Minority Institutions			Non-minority Institutions		
Total Enrollment	Support	Highest Degree Program	Number of Institutions	Number of Installations*	Access Rate (%)	Number of Institutions	Number of Installations*	Access Rate (%)
<500	Public	Associate	1	0	0	27	9	33
		Bachelor's	0		–	2	0	0
		Master's	0		–	6	4	67
		Doctorate	0		–	1	1	100
		Total	1	0	0	36	14	39
	Private	Associate	9	0	0	91	9	10
		Bachelor's	6	2	33	111	27(28)	24
		Master's	0		–	90	17(19)	19
		Doctorate	1	0	0	47	7	15
		Total	16	2	12	339	60(63)	18
	Both	Associate	10	0	0	118	18	15
		Bachelor's	6	2	33	113	27(28)	24
		Master's	0		–	96	21(23)	22
		Doctorate	1	0	0	48	8	17
		Total	17	2	12	375	74(77)	20
500-2,499	Public	Associate	8	4	50	240	167	70
		Bachelor's	7	7(9)	100	26	24(25)	92
		Master's	3	3	100	19	18(20)	95
		Doctorate	0		–	18	18(23)	100
		Total	18	14(16)	78	303	227(235)	75
	Private	Associate	5	3	60	43	15	35
		Bachelor's	20	12	60	249	181(194)	73
		Master's	2	2(6)	100	104	80(90)	77
		Doctorate	1	1	100	27	20(28)	74
		Total	28	18(22)	64	423	296(327)	70
	Both	Associate	13	7	54	283	182	64
		Bachelor's	27	19(21)	70	275	205(219)	75
		Master's	5	5(9)	100	123	98(110)	80
		Doctorate	1	1	100	45	38(51)	84
		Total	46	32(38)	70	723	523(562)	72

Table 4-A

Access to Computing Resources

*Given as the number of institutions with computer installations accompanied by the total number of installations in parentheses when different.

			Minority Institutions			Non-minority Institutions		
Total Enrollment	Support	Highest Degree Program	Number of Institutions	Number of Installations*	Access Rate (%)	Number of Institutions	Number of Installations*	Access Rate (%)
2,500-9,999	Public	Associate	9	9	100	159	150(155)	94
		Bachelor's	5	5	100	19	19(21)	100
		Master's	15	15(16)	100	85	82(93)	96
		Doctorate	2	1(2)	50	32	31(43)	97
		Total	31	30(32)	97	295	282(312)	96
	Private	Associate	1	0	0	3	1	33
		Bachelor's	1	1	100	10	9(10)	90
		Master's	5	5	100	55	53(60)	96
		Doctorate	1	1(3)	100	38	35(59)	92
		Total	8	7(9)	87	106	98(130)	92
	Both	Associate	10	9	90	162	151(156)	93
		Bachelor's	6	6	100	29	28(31)	97
		Master's	20	20(21)	100	140	135(153)	96
		Doctorate	3	2(5)	67	70	66(102)	94
		Total	39	37(41)	95	401	380(442)	95
10,000-19,999	Public	Associate	3	3	100	36	35	97
		Bachelor's	0		-	1	1	100
		Master's	0		-	29	27(38)	93
		Doctorate	0		-	47	40(76)	85
		Total	3	3	100	113	103(150)	91
	Private	Associate	0		-	0		-
		Bachelor's	0		-	0		-
		Master's	0		-	3	3	100
		Doctorate	0		-	12	12(33)	100
		Total	0		-	15	15(36)	100
	Both	Associate	3	3	100	36	35	97
		Bachelor's	0		-	1	1	100
		Master's	0		-	32	30(41)	94
		Doctorate	0		-	59	52(109)	88
		Total	3	3	100	128	118(186)	92

Table 4-B

Access to Computing Resources

*Given as the number of institutions with computer installations accompanied by the total number of installations in parentheses when different.

			Minority Institutions			Non-minority Institutions		
Total Enrollment	Support	Highest Degree Program	Number of Institutions	Number of Installations*	Access Rate (%)	Number of Institutions	Number of Installations*	Access Rate (%)
<20,000	Public	Associate	0		-	17	16(18)	94
		Bachelor's	0		-	0		-
		Master's	0		-	3	3(4)	100
		Doctorate	0		-	52	48(203)	92
		Total	0		-	72	67(225)	93
	Private	Associate	0		-	0		-
		Bachelor's	0		-	0		-
		Master's	0		-	0		-
		Doctorate	0		-	5	5(16)	100
		Total	0		-	5	5(16)	100
	Both	Associate	0		-	17	16(18)	94
		Bachelor's	0		-	0		-
		Master's	0		-	3	3(4)	100
		Doctorate	0		-	57	53(219)	93
		Total	0		-	77	72(241)	94
Across Enrollments	Public	Associate	21	16	76	479	377(384)	79
		Bachelor's	12	12(14)	100	48	44(47)	92
		Master's	18	18(19)	100	142	134(159)	94
		Doctorate	2	1(2)	50	150	138(346)	92
		Total	53	47(51)	89	819	693(936)	85
	Private	Associate	15	3	20	137	25	18
		Bachelor's	27	15	56	370	217(232)	59
		Master's	7	7(11)	100	252	153(172)	61
		Doctorate	3	2(4)	67	129	79(143)	61
		Total	52	27(33)	52	888	474(572)	53
	Both	Associate	36	19	53	616	402(409)	65
		Bachelor's	39	27(29)	69	418	261(279)	62
		Master's	25	25(30)	100	394	287(331)	73
		Doctorate	5	3(6)	60	279	217(489)	78
		Total	105	74(84)	70	1,707	1,167(1,508)	68

Table 4-C

Access to Computing Resources

*Given as the number of institutions with computer installations accompanied by the number of installations in parentheses when different.

Apparently the computing resources for academic programs in computer science and related fields exist at minority institutions. Other reports[3] may reveal whether the quality of these resources can support academic programs. This report provides further information on the use of computers at minority and non-minority institutions as well as the faculty for academic programs in computer science and the costs of computer installations at minority and non-minority institutions.

Computer Uses and Applications. The number and percent of computer installations devoted to three major categories of usage are given in Table 5. Just over seven percent of the computer installations at both minority and non-minority institutions were reported as devoted to administrative applications. Minority and non-minority institutions reported the same percentage of computer installations reserved for instructional use only, 5.7%. Consistent with their higher degree programs in computer science and related fields, non-minority institutions had higher percentages of computer installations used only for research or just for research and instruction. But the majority of colleges and universities, whether minority or non-minority, used their computers for administrative applications as well as research and instruction. About two-thirds of the computer installations fell in this mixed category of usage.

The consistent pattern of computer uses for minority and non-minority institutions seems to contradict differences already observed in degree programs for computer science and related fields. From the very low numbers of such degree programs at minority colleges and universities it might be expected that there would be either a lower access rate to computing resources or a different

---

[3] See Richard M. Jaeger, Academic Computing in Minority Colleges and Universities. Greensboro, N.C.: University of North Carolina at Greensboro, Center for Educational Research and Evaluation, 1979.

	Minority Institutions		Non-minority Institutions	
Type of Usage	Number of Installations	Percent	Number of Installations	Percent
Administration	5	7.1	97	7.8
Research	1	1.4	57	4.6
Instruction	4	5.7	71	5.7
Administration and Research/Instruction	50	71.4	829	66.9
Research and Instruction	3	4.3	124	10.0
Unknown	7	10.0	61	4.9

Table 5

Computer Usage by Installation

pattern of usage at minority institutions than at non-minority institutions. Since the access rates for the two types of institutions were comparable (i.e., 70% at minority institutions and 68% at non-minority institutions), there should be differences evident in the patterns of computer use. There was no obvious difference in these patterns. Two explanations seem plausible: there may be differences in the quality and power of computing resources at minority and non-minority institutions not apparent from the quantitative report of access to computers, or the category including administrative and instructional or research uses of computers may obscure real differences in the allocation of computing resources to each kind of application.

Table 6 and Table 7 show the extent of instructional use of computers in terms of numbers of courses and numbers of students, and these tables suggest much heavier instructional use of computers at non-minority colleges and universities. Table 6 contains data on comparable minority and non-minority institutions, colleges at which the bachelor's degree is the highest degree program in any discipline and in which student enrollment is 500-2,499. Although the ratio of non-minority to minority institutions, computer installations, and courses involving some computer use is approximately 10:1, the ratio of total students exposed to computers is almost 16:1 at these small baccalaureate colleges. The ratio of students with academic exposure to computers across sizes and degree programs is 50:1 for non-minority institutions to minority institutions, as shown in Table 7. Clearly the large enrollments found at some non-minority colleges and universities must contribute to this vast disparity, but it is doubtful that size alone accounts for the difference. Facilitation of student exposure to computers at minority colleges and universities seems an appropriate response to this inequity. Such facilitation should come about naturally from expansion of academic programs in computer science

Academic Field	Minority Institutions[1] Number of Courses	 Number of Students	Non-minority Institutions[2] Number of Courses	 Number of Students
Engineering	4	10	124	3,230
Environmental & Life Sciences	9	50	66	2,486
Computer Sciences	29	478	383	9,138
Mathematics & Statistics	28	494	315	8,380
Physical Sciences	22	345	216	3,768
Psychology	4	0	62	1,701
Social Sciences	8	140	130	2,152
Education	1	25	16	798
Business & Commerce	10	252	121	3,857
Other	27	565	44	2,006
Total	142	2,359	1,477	37,516

Table 6

Computers in Classes, Student Instructional Use:
Institutions with Bachelor's Degree as Highest Degree
and Total Enrollment of 500-2,499 Students

[1] Based on 19 institutions reporting 21 computer installations (total sample of 53 institutions with 27 responding to the survey).

[2] Based on 205 institutions reporting 219 computer installations (total sample of 453 institutions with 275 responding to the survey).

Academic Field	Minority Institutions[1] Number of Courses	Minority Institutions[1] Number of Students	Non-minority Institutions[2] Number of Courses	Non-minority Institutions[2] Number of Students
Engineering	141	4,914	7,214	182,938
Environmental and Life Sciences	83	1,557	2,325	68,268
Computer Sciences	264	8,588	8,367	283,443
Mathematics & Statistics	92	2,398	3,618	122,679
Physical Sciences	55	990	2,360	83,043
Psychology	29	115	1,292	46,730
Social Sciences	98	1,266	2,990	84,335
Education	8	58	1,080	31,234
Business & Commerce	111	3,192	5,194	255,466
Other	73	1,742	2,563	84,498
Total	954	24,820	37,003	1,242,634

Table 7

Computers in Classes, Student Instructional Use:
All Institutions

---

[1] Based on 74 institutions reporting 84 computer installations (total sample of 202 institutions with 105 responding to the survey).

[2] Based on 1,167 institutions reporting 1,508 computer installations (total sample at 2,908 institutions with 1,707 responding to the survey).

and related fields and would not seem to warrant as high a priority for attention as those curriculum programs.

Table 8 shows the number of computer installations supporting various programming languages and certain modes of access. As with the patterns of computer use (see Table 5), there is remarkable similarity in the support of different languages at minority and non-minority institutions. The exceptions to this general pattern are graphics capabilities and the PASCAL language, which in turn imply a possible need for higher-level and more diverse support packages at minority institutions. And such support packages would seem a derivative benefit if there were to be an increase in computer science programs at minority institutions accompanied by upgraded computer equipment and computing capabilities.

The numbers of computer installations with interactive access and with remote access also show minority institutions to be similar to non-minority installations. The fact that roughly two-fifths of the computer installations at both types of institutions had interactive computing available for supporting work on computers suggests that all colleges and universities should seek to increase accessibility to their computing resources.

Staff for Degree Programs and Costs for Computer Installations. Figures on the numbers of staff and faculty in degree programs for computer science and related disciplines appear in Table 9. These figures represent the totals for the 105 minority institutions and the 1,707 non-minority institutions which responded to the fourth inventory of computers in higher education. While the disparity in the number of responding institutions and the number of non-minority institutions with large student enrollments explain some of the sheer differences in numbers of staff and faculty at minority and non-minority institutions, these factors do not fully account for the gross imbalances with respect to faculty.

	Minority Institutions		Non-minority Institutions	
	Number of Installations	Percent	Number of Installations	Percent
Programming Languages:				
FORTRAN	60	71.4	1,076	71.4
COBOL	56	66.7	884	58.6
BASIC	49	58.3	821	54.4
RPG	43	51.2	611	40.5
PL/1	20	23.8	384	25.5
Graphics	3	3.6	329	21.8
APL	19	22.6	295	19.6
PASCAL	0	0.0	147	9.7
COURSEWRITER	5	6.0	86	5.7
TUTOR	1	1.2	40	2.7
PLANIT	0	0.0	15	1.0
LOGO	0	0.0	13	.9
Mode of Access:				
Interactive Computing	31	36.9	623	41.3
Remote Computing	29	34.5	486	32.2

Table 8

Programming Languages and Computing Mode

Degree Program Staff*	Minority Institutions	Non-minority Institutions
Staff		
Full-time Staff	117	2,653
Research Assistants (part-time)	7	684
Teaching Assistants (part-time)	46	1,421
Other (part-time)	73	1,886
Total FTE Staff (full-time equivalent)	174	4,491
Faculty		
Computer Science (Ph.D.'s)	12	716
Other (Ph.D.'s)	23	1,075
Joint Appointments	20	702
Other		
Computer Science (Ph.D.'s)	1	67
Other (Ph.D.'s)	4	144

Table 9

Staff and Faculty in Degree Programs
for Computer Science and Related Fields

*Excluding secretarial and clerical support.

Just thirty-five doctoral faculty members at 105 minority colleges and universities held full-time appointments in academic programs related to computer science in contrast to nearly 1,800 such faculty at non-minority institutions. Lack of the appropriate faculty seems to be the major reason for the scarcity of computer science programs at minority institutions, which in turn has led to under-representation of key minorities in the computer professions.

Information pertinent to the place of computer installations in the organizational structure of academic institutions is given in Table 10. A greater percentage of the heads of computer installations at minority institutions report directly to the head of the institution, perhaps indicating the importance associated with computing resources at minority institutions. Those installations reserved for administrative applications tend to come under the chief business officer; those installations devoted to instruction (and research) tend to come under the chief academic officer. But computer installations with other than just administrative applications also come under the chief business officer, suggesting both the costs of computing services and the reliance of institutions on computers for a combination of administrative and other applications.

Average costs for minority and non-minority small baccalaureate colleges are shown in Table 11. Among the computer installations that provided cost figures were 19 minority respondents and 193 non-minority respondents. Minority baccalaureate colleges with 500-2,499 students actually reported spending more on their computer installations than did comparable non-minority colleges. This larger expenditure went to capital costs for hardware and operating costs for software services. These cost categories for higher expenditures would be consistent with new acquisition of computer equipment and

Supervisor for Head of Installation Computer	Minority Institutions Number of Installations	Percent	Non-minority Institutions Number of Installations	Percent
Head, Institution or Campus	21	30.0	236	19.0
Head, Computer Facilities	3	4.3	44	3.6
Head, Research	2	2.9	28	2.3
Chief Academic Officer	11	15.7	218	17.6
Chief Business Officer	14	20.0	326	26.3
Business Officer (other)	0	0.0	4	.3
Dean, Engineering	1	1.4	30	2.4
Dean (other)	1	1.4	96	7.7
Department Chair	6	8.6	84	6.8
Other	2	2.9	92	7.4
Unknown	9	12.9	81	6.5

Table 10

Organizational Structure
for Computer Installations

	Minority Institutions[1]		Non-minority Institutions[2]	
	Number of Respondents (Installations)	Installation Average (1976-77)	Number of Respondents (Installations)	Installation Average (1976-77)
Capital Costs				
Hardware	9	$49,111	104	$31,702
Software	6	6,167	45	6,022
Buildings & Furnishings	10	11,900	47	10,894
Operating Costs				
Staff	17	33,000	145	33,131
Hardware (lease)	13	24,538	111	21,757
Software Services	5	15,300	43	7,907
Other	14	13,929	139	13,892
Total Costs Capital and Operating	19	$92,053	193	$72,953
Sources of Income				
Institution	18	$67,222	182	$59,231
State	0	--	3	56,333
Federal	7	52,143	23	64,917
Total	19	$82,947	189	$71,825

Table 11

Computing Expenditures and Income:
Institutions with Bachelor's Degree as Highest Degree
and Total Enrollment of 500-2,499 Students

[1] Based on 19 institutions reporting 21 computer installations (total sample of 53 institutions with 23 responding to the survey).

[2] Based on 205 institutions reporting 219 computer installations (total sample of 453 institutions with 275 responding to the survey).

with expansion of available software. So the higher costs of computer installations at these minority institutions probably reflects recent entry into the computer field rather than a higher level of sustained fiscal support.

Conclusions

The percentage of minority colleges and universities with access to computing resources is nearly the same as that for non-minority colleges and universities. Moreover, the pattern of academic computer installations dedicated to specific applications in administration, instruction, or research was quite similar for minority and for non-minority institutions. And computer installations for minority and non-minority institutions tended to support much the same set of programming languages. Small baccalaureate minority colleges even spent more on their computer installations than did comparable non-minority colleges. The problem of under-representation of minority groups in the computer professions appears not to be one of hardware or computing resources but of persons.

Faculty members with doctorate degrees in computer science or related fields were a very scarce resource at minority colleges and universities. The scarcity of such faculty was reflected by the low numbers of degree programs in computer science and related fields and by the low numbers of students awarded these degrees at minority institutions. If the imbalance of minority representation in employment positions in the computer field is to be addressed through concerted attention, that attention should be focused on relevant curriculum programs and faculty members at minority colleges and universities.

PREFACE

During the early 1960's, a sizeable infusion of federal funds stimulated the development of academic computing capability in many U.S. colleges and universities. As a result, the use of computing in a variety of academic pursuits, ranging from the physical sciences to the creative arts, has shown tremendous growth.

Unfortunately, many minority colleges and universities were not equipped to participate in this cycle of computing growth at the time it began, and have made relatively little progress toward gaining their fair share of computing assets in more recent years. To realize their full potential as academic institutions, this computing imbalance must be redressed.

This report contains the results of a mail survey of academic officers in a self-selected subset of the 239 minority higher education institutions in the United States and its territories. The survey was designed to elicit information on the status and likely short-term growth of academic computing in these institutions. It covered a broad range of topics, including institutional investment in academic computing, the availability of computing hardware and software for academic purposes, the present and short-term-future computing skills, capabilities, and activities of faculty and students, the presence and activities of computing personnel, and the status of education in the sciences in minority institutions.

The survey was one element of a three-part needs assessment of academic computing in minority higher education institutions, conceived and planned by Sr. Patricia Marshall of Xavier University of Louisiana. Sr. Marshall defined the basic research issues that were of concern in the study, handled all field procedures for the survey, including mailing of questionnaires, follow-up of

APPENDIX D

QUESTIONNAIRE SURVEY

ACADEMIC COMPUTING IN MINORITY COLLEGES AND UNIVERSITIES

RICHARD M. JAEGER
CENTER FOR EDUCATIONAL RESEARCH AND EVALUATION
SCHOOL OF EDUCATION
UNIVERSITY OF NORTH CAROLINA
GREENSBORO, NC 27412

non-respondents, and receipt of completed materials, and edited and reduced completed questionnaire responses to a computer processable data set.

Detailed research questions, survey questionnaires, plans for analysis of data, and documents linking questionnaires to research questions and analysis plans were developed by the senior author of this report, with the assistance of Ms. Stephanie Pigford, Pamela Stribling, and Marian Wolf, graduate students in the M. Ed. program in educational research and evaluation at the University of North Carolina at Greensboro. Data were analyzed and this report was prepared in the Center for Educational Research and Evaluation, University of North Carolina at Greensboro.

I would like to acknowledge the assistance of Ms. Judith Cole and Mrs. Judy McKenzie Jaeger in organizing the report and interpreting selected results. In addition, Ms. Marji Wright of the Statistical Consulting Service at UNC-Greensboro assisted with computer analysis of part of the data. Finally, this report could not have been prepared without the tireless assistance of Ms. Debra Aydelette, who typed the entire manuscript with the excellence that typifies her work.

RMJ

Greensboro, North Carolina

TABLE OF CONTENTS

Preface ii

Highlights vii

Introduction 1

I. Pertinent Descriptors of the Set of Institutions 4

- A. Institutional Size 4
- B. Academic Orientation of the Institutions 7
- C. Education in the Sciences 22
- D. Racial and National Origin Compositions of the Institutions . . . 36

II. Present Academic Computing Status 48

- A. Hardware and Equipment 48
- B. Computing Software 82
- C. Computing Personnel 85
- D. Dollar Investment in Academic Computing 93
- E. Student and Faculty Computing Capabilities 113
- F. Extent of Computer Use 127
- G. Types of Student and Faculty Use of Computing 139
- H. Attitudes Toward Academic Computing 144

III. Desired Academic Computing Status, 1981-82 153

- A. Hardware and Equipment 153
- B. Computing Software 176
- C. Student and Faculty Skills, Access to, and Use of Computers . . 180
- D. Summary 210

IV. Efforts to Improve Academic Computing Capabilities 213

- A. Existence of Study Groups 213
- B. Participation in Academic Computer Conferences 214

C. Plans to Improve Computer Facilities and Capabilities 216

D. Investigation of Alternative Arrangements 218

E. Summary 222

V. Perceived Problems in Developing Improved Academic Computing Capabilities 224

VI. The Relationship Between Education in the Sciences and Current Academic Computing Status 237

A. Relationships Between Courses and Students in the Sciences, and Access to Academic Computing 238

B. Relationships Between Courses and Students in the Sciences, and the Computing Skills of Students and Faculty in the Sciences . . 260

C. Relationships Between Courses and Students in the Sciences, and Science Faculty Use of Computers 304

D. Relationships Between Courses and Students in the Sciences, and Efforts to Improve Academic Computing Capabilities 318

E. Relationships Between the Size of Science Faculties and Access to Academic Computing 329

F. Relationships Between the Size of Science Faculties and the Computing Skills of Students and Faculty in the Sciences 344

G. Relationships Between the Size of Science Faculties and Science Faculty Use of Computers 365

H. Relationships Between the Size of Science Faculties and Efforts to Improve Academic Computing Capabilities 383

I. Relationships Between Science Degree Offerings and Access to Academic Computing 388

J. Relationships Between Science Degree Offerings and the Computing Skills of Faculty and Students in the Sciences 422

K. Relationships Between Science Degree Offerings and Science Faculty Use of Computers 426

L. Relationships Between Science Degree Offerings and Efforts to Improve Academic Computing Capabilities 519

M. Relationships Between Science Degree Productivity and Access to Academic Computing 525

N. Relationships Between Science Degree Productivity and the Computing Skills of Faculty and Students in the Sciences 533

O. Relationships Between Science Degree Productivity and Science Faculty Use of Computers 568

P. Relationships Between Science Degree Productivity and Efforts to Improve Academic Computing Capabilities 652

Q. Summary 658

Appendix A — Questionnaires 665

52

HIGHLIGHTS

It is virtually impossible to summarize a report on as complex an issue as academic computing in minority colleges and universities. That is especially true when the report is almost 700 pages in length and incorporates more than 500 tables of data. However, some of the myriad findings discussed in this report stand out as particularly important, unexpected, or telling. A few of those findings are highlighted here.

- Responding institutions varied widely in the number of science faculty they employed: the smallest institutions had none employed full time and the largest had almost 500; the smallest fourth of the institutions had no more than 35 full-time science faculty and the largest fourth had at least 160 full-time science faculty.

- Presidents or chancellors at 24 percent of the responding institutions stated that sciences are emphasized more than arts in their schools; 17 percent reported that arts are emphasized more than sciences; 57 percent reported equal emphasis.

- Responding institutions emphasized undergraduate education overwhelmingly: almost 90 percent of responding presidents or chancellors reported this emphasis, and another 8 percent reported that undergraduate and graduate instruction were emphasized equally.

- Virtually all responding academic vice presidents or deans reported that their institutions offered some courses in the sciences. Just over half reported that their institutions offered associate or bachelors degrees in the sciences, and almost two in ten reported that their institutions offered science masters degrees.

- Every responding institution reported enrollment of at least 80 percent minority students. Nearly sixty percent of the responding institutions reported a majority black student enrollment, and over 40 percent reported at least 90 percent black student enrollment.

- Eighty percent of responding directors of academic computer centers reported that a computer was available for academic use at their institutions.

- Just over half of the responding computer center directors in institutions having access to a computer reported the exclusive use of central computers; nearly ten percent reported the exclusive use of personal computers; almost 40 percent reported the use of both central and personal computers.

- With few exceptions, responding academic computer center directors reported the availability of very few input/output devices for academic computing use at their institutions.

- Over 90 percent of responding computer center directors in institutions that have access to a computer reported that the BASIC language is available for academic computing. The SPSS program package was reported to be available in just over half the institutions that provide access to a computer.

- Almost 60 percent of responding computer center directors reported that their institutions have an academic computer center or staff.

- Almost half of the responding computer center directors reported that their institutions spent less than $10,000 on computing hardware during the 1977-78 academic year. Eighty-eight percent of the institutions were reported to have spent less than $50,000 on computing hardware that year.

- About two-thirds of responding institutions were reported to have spent less than $1000 on computing software during the 1977-78 academic year; about the same proportion spent less than $10,000 to support computing personnel that year.

- Median expenditures for computing hardware during the five-year period 1973 to 1978 were in the $100,000 to $250,000 range at responding minority institutions. Corresponding expenditures for computing software were in the $5,000 to $10,000 range for the five-year period.

- Forty percent of responding directors of academic computing centers reported receiving some computing support from the federal government; support funds from their own institutions were cited by an even greater percentage. Of the institutions that reported receiving any federal funds during the 1977-78 academic year, over two-thirds received less than $20,000.

- Nearly ninety percent of responding presidents or chancellors agreed with the statement that "Many students would (or do) benefit from a computer science program at this institution."

- Only six percent of responding computing center directors suggested that, by 1981-82, their institutions should provide only batch processing capability for academic computing; another 27 percent opted for interactive computing capability by that date; and 10 percent called for use of personal computers only. All others wanted some combination of batch, interactive and personal computing capability for their institutions by 1981-82.

- More than 90 percent of responding computer center directors wanted both BASIC and FORTRAN languages to be available at their institutions by 1981-82; almost 85 percent wanted COBOL by that date.

- Almost three-fourths of responding presidents or chancellors and 86 percent of responding heads of science departments suggested that, by 1981-82, students at their institutions should have access to computers for unscheduled activities, such as experimentation and games.

- Almost two-thirds of responding academic vice presidents or deans reported that campus-wide groups had met at their institutions, to study the acquisition or improvement of computer facilities and capabilities for instructional purposes. Sixty percent of responding heads of science departments reported that study groups had met for similar purposes.

- Almost two-thirds of responding presidents of minority institutions reported that their institutions had a long-range plan for improvement of academic computing services.

- Only half of the responding directors of academic computer centers reported that their institutions owned a computer used for academic purposes.

- Almost three-fourths of responding directors of academic computing centers cited budget limitations as being a major problem or an extremely severe problem in the development of academic computing at their institutions.

- Fifty-seven percent of responding presidents or chancellors reported that some agencies or forces external to their institutions hampered the development of academic computing at those institutions. The federal government and state governments were cited as sources of restrictions by about one-fourth of the respondents.

- Forty percent of responding directors of academic computing centers noted that academic computing at their institution was hampered by lack of expertise of potential computer users.

- Analyses of relationships between the size and scope of academic science programs and academic computing capabilities in minority institutions provided clear evidence of many linkages between these factors. For example, minority institutions were far more likely to have made efforts to improve their academic computing capabilities if they employed a large number of faculty members in the sciences.

Academic Computing in Minority Higher Education Institutions

Introduction

This report contains the results of a mail survey of presidents or chancellors, vice presidents or deans, directors of academic computer centers, and heads of science departments in minority institutions of higher education in the United States and some of its territories. A minority institution is defined operationally to have a majority of its enrollment composed of members of one or more of the following racial or national origin groups: Alaskan Indian, American Indian, Asian, Black, Eskimo, and Hispanic. Two hundred and thirty-nine such institutions were surveyed to determine their status, and the perceived needs expressed by their academic officers and faculty, in the area of academic computing. Ancillary information on such topics as the characteristics of education in science, the racial composition of the student body, the academic orientation of the institution, and the size of the institution was also collected, to provide a context for interpreting data on academic computing.

Although data were requested from the entire population of 239 minority institutions, rates of response were considerably less than 100 percent. Usable data were received from 96 presidents or chancellors, from 83 vice presidents or deans, from 178 heads of science departments in 87 different institutions, and from 55 heads of academic computer centers. All results in this report are based solely on these data, and should be extrapolated to the entire population of minority institutions with some caution. Responding institutions were self-selecting and, to some degree, are probably unrepresentative of the population of institutions. In reporting percentages, we shall consider only the set of responding institutions or officers within those institutions, with no direct implication that these findings are necessarily generalizable to the entire population. I would hasten to add, however, that these data may well be the best of their type available for the population of minority institutions, despite their possible lack of representativeness.

This report contains six major parts. Part I, Pertinent Descriptors of the Set of Institutions, contains information on such topics as the size of faculties at the various institutions and the types of degrees offered; the academic orientations of the institutions and the types of students their officers perceive to be most important; the size and extensiveness of education programs in the sciences; and the racial and national origin compositions of the institutions. Part II is entitled Present Academic Computing Status of the Institutions. It contains a wealth of information on the institutions' investment in academic computing, including statistics on computing hardware, computing software, computer-related personnel, and the institutions' dollar investments in academic computing. In addition, Part II provides information on the extensiveness of academic computer use in these institutions; the current capabilities of students and faculty in these institutions to engage in academic computing; and the types of academic computing students and faculty presently pursue. Finally, the attitudes of major academic officers toward academic computing are reported, both from their own perspectives and from the views of directors of academic computing centers. In Part III, Desired Academic Computing Status in 1981-82, we report the views of all four types of respondents on such topics as desired academic computing hardware and equipment; desired software capabilities; and desired capabilities of students and faculty to engage in academic computing. The reader can readily compare data on the institutions' present computing status (Part II) with data on their desired status (Part III), to gain insight into the academic computing needs perceived by officers in these institutions for the short-term future.

Part IV, Efforts to Improve Academic Computing Capabilities, describes the current and planned efforts of these institutions to help themselves improve their current academic computing status. We report on such activities as formulation of long-range plans for academic computing, the existence of study groups on computing, the efforts of faculty to participate in academic computing conferences, and the efforts of the institutions to engage in cooperative computing arrangements through networks or other linkages. In Part V, we report the respondents' perceptions of the factors, both internal and external to their institutions, that hinder development of improved academic computing capabilities. This section is entitled Perceived Problems in Developing Improved Academic Computing Capabilities. The final section, Part VI, contains data that allow examination of the relationships between the status of academic computing in these institutions, and the extensiveness of their education programs in the sciences. Although these relational data will not support unequivocal causal inferences, it may well be the case that education in the sciences suffers when academic computing capability is limited.

I. Pertinent Descriptors of the Set of Institutions

A. Institutional Size

Although there are many potential indicators of the size of an academic institution, data collected in this survey were limited to two questions on the size of teaching faculties. Academic deans or vice presidents were asked to report the number of full-time faculty currently employed, and the number of full-time equivalent faculty currently employed. The latter statistic allows inclusion of part-time and full-time faculty, and should therefore provide a more accurate indication of the quantity of academic offerings in these institutions. Since no prior definition of full-time teaching was provided to respondents, it was left to individual deans or vice presidents to apply the definition used in their institution.

Data on the size of teaching faculties in responding institutions are shown in Tables 1 through 4. Table 1 contains a frequency distribution of the size of reported full-time teaching faculties. The column headed "Code" indicates the number of full-time faculty employed. The column headed "Freq" indicates the number of institutions reporting a particular full-time faculty size. The "Adj Pct" column indicates the percentage of responding deans or vice presidents reporting a particular full-time faculty size, adjusted for non-respondents to this question. Finally, the "Cum Pct" column indicates the adjusted cumulative percentage of deans or vice presidents reporting full-time faculties of a given size or less. From the data in Table 1 we can see that responding institutions varied widely in the sizes of their full-time faculties. The two smallest institutions had no full-time faculty members in April, 1979, and the largest had 481. The smallest fourth of the institutions had 33 full-time faculty or less, and the largest fourth had 161 full-time faculty or more. Data on numbers of full-time faculty are summarized in Table 2. The average number of

```
08/25/79         FILE - DEANS     - CREATED 08/25/79              PAGE  5

FACFULL   NUMBER FULLTIME FACULTY


                    ADJ CUM                      ADJ CUM                         ADJ CUM
     CODE      FREQ PCT PCT      CODE      FREQ  PCT PCT       CODE       FREQ  PCT PCT

       0.         2   3   3       60.         1    1  41       150.          1    1  72
       3.         1   1   4       62.         1    1  42       155.          1    1  73
       5.         1   1   5       63.         1    1  43       158.          1    1  75
       7.         1   1   6       68.         2    3  46       161.          1    1  76
       9.         1   1   8       69.         1    1  47       167.          1    1  77
      10.         1   1   9       70.         1    1  48       180.          1    1  78
      11.         1   1  10       72.         2    3  51       193.          2    3  81
      12.         1   1  11       74.         1    1  52       196.          1    1  82
      15.         2   3  14       76.         1    1  53       200.          1    1  84
      16.         1   1  15       78.         1    1  54       205.          1    1  85
      20.         1   1  16       87.         1    1  56       242.          1    1  86
      21.         1   1  18       89.         1    1  57       249.          1    1  87
      23.         1   1  19       92.         1    1  58       250.          1    1  89
      24.         2   3  22       98.         1    1  59       255.          1    1  90
      29.         1   1  23      108.         1    1  61       278.          1    1  91
      33.         2   3  25      110.         1    1  62       288.          1    1  92
      34.         3   4  29      111.         1    1  63       306.          1    1  94
      35.         1   1  30      119.         1    1  65       347.          1    1  95
      39.         1   1  32      120.         1    1  66       376.          1    1  96
      43.         1   1  33      122.         1    1  67       406.          1    1  97
      50.         1   1  34      128.         1    1  68       432.          1    1  99
      54.         2   3  37      133.         1    1  70       481.          1    1 100
      57.         2   3  39      136.         1    1  71


                               M I S S I N G   D A T A
     CODE      FREQ              CODE      FREQ                CODE       FREQ

     999.         4
```

Table 1. Distribution of number of full-time faculty employed in 79 minority higher education institutions, Spring, 1979.

```
MEAN         113.342     STD ERR      12.336        MEDIAN       72.250
MODE          34.000     STD DEV     109.643        VARIANCE  12021.605
KURTOSIS       1.732     SKEWNESS      1.443        RANGE       481.000
MINIMUM        0.0       MAXIMUM     481.000

VALID CASES       79     MISSING CASES     4
```

Table 2. Summary statistics on number of full-time faculty employed in 79 minority higher education institutions, Spring, 1979.

full-time faculty for these institutions was just over 113, and the median was just over 72. The largest ten percent of the institutions have a wide range of sizes of their full-time faculties, and contribute strongly to the positive skewness in the overall distribution.

A total of 68 deans or academic vice presidents responded to the question on number of full-time equivalent (FTE) faculty employed. The distribution of responses to this question is shown in Table 3. Again we see that the range of faculty sizes in responding institutions is quite large. The smallest institutions has less than one full-time equivalent instructor, and the largest has 457. The smallest fourth of these institutions have fewer than 20 FTE teaching faculty, and the largest fourth have 143 or more. From Table 4, containing summary statistics on the number of FTE faculty in these institutions, we see that the average number is just under 104, and the fiftieth percentile is 71.5. Again, a positively skewed distribution is evident. Since data in Tables 1 and 2 apply to a somewhat larger number of institutions than do data in Tables 3 and 4, these findings cannot be compared directly. It is clear that the number of FTE faculty was not reported by deans or vice presidents in some of the larger institutions reflected in Tables 1 and 2.

B. Academic Orientation of the Institutions

A number of questions asked of presidents or chancellors and of academic vice presidents or deans were designed to assess the academic orientation of the minority higher education institutions. These questions covered a range of specific topics, including the types of subjects emphasized most in the offerings of the institutions, the level of education (undergraduate vs. graduate) emphasized most, the educational purposes these academic officers perceived to be most important at their institutions, and the bases usually used for evaluating faculty for promotion. This latter group of questions was intended to reveal

```
FACFTE    NUMBER FULLTIME EQUIVALENT FACULTY

                ADJ  CUM                      ADJ  CUM                        ADJ  CUM
  CODE    FREQ  PCT  PCT     CODE     FREQ  PCT  PCT      CODE      FREQ  PCT  PCT

    0.       1    1    1      44.        1    1   41      131.         1    1   74
    1.       1    1    3      45.        1    1   43      136.         1    1   75
    3.       2    3    6      48.        1    1   44      143.         1    1   76
    4.       1    1    7      59.        1    1   46      149.         1    1   79
    6.       1    1    9      68.        2    3   49      177.         1    1   73
    7.       1    1   10      71.        1    1   50      182.         1    1   81
    8.       1    1   12      72.        1    1   51      186.         1    1   82
   10.       2    3   15      74.        1    1   53      192.         1    1   84
   12.       1    1   16      75.        1    1   54      206.         1    1   85
   14.       3    4   21      79.        1    1   56      209.         1    1   87
   15.       2    3   24      90.        1    1   57      213.         1    1   88
   20.       2    3   26      93.        1    1   59      258.         1    1   90
   21.       1    1   28      96.        1    1   60      268.         1    1   91
   23.       1    1   29      98.        2    3   63      288.         1    1   93
   25.       1    1   31     104.        1    1   65      340.         1    1   94
   28.       1    1   32     106.        1    1   66      400.         1    1   96
   31.       1    1   34     110.        1    1   68      406.         1    1   97
   35.       2    3   37     116.        1    1   69      407.         1    1   99
   36.       1    1   38     118.        1    1   71      457.         1    1  100
   43.       1    1   40     122.        1    1   72

                              M I S S I N G   D A T A
  CODE    FREQ               CODE    FREQ                 CODE    FREQ

  999.      15
```

Table 3. Distribution of number of full time equivalent faculty employed in 68 minority higher education institutions, Spring, 1979

```
MEAN          103.750      STD ERR       13.493      MEDIAN        71.500
MODE           14.000      STD DEV      111.266      VARIANCE   12380.098
KURTOSIS        1.967      SKEWNESS       1.556      RANGE        457.000
MINIMUM         0.0        MAXIMUM      457.000

VALID CASES        68      MISSING CASES     15
```

Table 4. **Summary statistics on number of full time equivalent faculty in 68 minority higher education institutions, Spring, 1979.**

the press for research and publication imposed on faculty by the institutions.

Both presidents or chancellors and vice presidents or deans were asked to specify for their institutions, whether "arts are emphasized more than sciences," "sciences are emphasized more than arts," or "arts and sciences are emphasized equally." Since the reports provided by vice presidents or deans were very similar to those provided by presidents or chancellors, and because a somewhat greater number of presidents or chancellors responded to this question, only results for the latter group will be discussed. Data in Tables 5 and 6 reveal that arts are emphasized more than sciences in almost 17 percent of the minority institutions represented by the views of 96 responding presidents or chancellors. Sciences are emphasized more than arts in 24 percent of these institutions, and arts and sciences are emphasized equally in the majority of institutions (57 percent). In two institutions, either vocational education or technical education receive greatest emphasis. Table 6 is of a type that will appear frequently in this report. It is largely redundant with the "absolute frequency" column of Table 5, but provides a graphic display of the distribution of responses to the question on subject-matter emphasis, allowing many readers to understand the makeup of the distribution of responses very quickly. The summary data presented at the bottom of Table 6 should be ignored in this case, since the code numbers used to represent the categories of response have no numerical meaning. This will be true for many of the questions asked in this survey.

Like subject-matter emphasis, both presidents or chancellors and vice presidents or deans were asked to report the level of educational emphasis in their institutions. Again, only the data provided by presidents or chancellors will be reported here since more institutions are represented in this data base and because data from both sources were very similar in distribution. Tables

```
08/25/79          FILE - PRESIDEN - CREATED 08/25/79          PAGE  11

SUBEMP    SUBJECT-MATTER EMPHASIS OF INSTITUTION

                                                RELATIVE  ADJUSTED     CUM
                                      ABSOLUTE    FREQ      FREQ      FREQ
CATEGORY LABEL                 CODE     FREQ     (PCT)     (PCT)     (PCT)

ARTS >  SCIENCE                 1.        16      16.7      16.7      16.7

SCIENCE > ART                   2.        23      24.0      24.0      40.6

ARTS=  SCIENCE                  3.        55      57.3      57.3      97.9

VOCATUN-AL MOST                 4.         1       1.0       1.0      99.0

TECHNICA-AL M[illegible]        5.         1       1.0       1.0     100.0
                                      ------    ------    ------
                               TOTAL      96     100.0     100.0
```

Table 5. Distribution of subject-matter emphases in 96 minority higher education institutions, Spring, 1979.

```
SUBEMP     SUBJECT-MATTER EMPHASIS OF INSTITUTION

       CODE
             I
          1. ********* (     16)
             I  ARTS >  SCIENCE
             I
             I
          2. ************* (     23)
             I  SCIENCE > ART
             I
             I
          3. ***************************** (     55)
             I  ARTS=  SCIENCE
             I
             I
          4. ** (      1)
             I  VOCATON-AL MOST
             I
             I
          5. ** (      1)
             I  TECHNICA-AL MOST
             I
             I.........I.........I.........I.........I.........I
             0        20        40        60        80       100
             FREQUENCY

MEAN          2.458      STD ERR       0.084      MEDIAN        2.664
MODE          3.000      STD DEV       0.820      VARIANCE      0.672
KURTOSIS      0.020      SKEWNESS     -0.449      RANGE         4.000
MINIMUM       1.000      MAXIMUM       5.000

VALID CASES      96      MISSING CASES     0
```

Table 6. Histogram of subject-matter emphases in 96 minority higher education institutions, Spring, 1979.

7 and 8 provide information on level of academic emphasis in 96 minority higher education institutions, as reported by presidents or chancellors. In almost nine out of ten of these institutions, the emphasis is on undergraduate education. Graduate education is emphasized more than undergraduate education in only one institution, and the two levels receive equal emphasis only in eight institutions. Two presidents or chancellors added to the options given on the questionnaire to report that no degree was given at their institution or that only an associate degree was awarded.

In a further attempt to determine the principal academic orientations of the institutions, both presidents or chancellors and vice presidents or deans were asked to specify the importance of various educational purposes at their institutions. For the reasons described above, only data provided by presidents or deans will be discussed here. Respondents were presented with a list of five educational activities, and were asked to specify for each, whether the activity was the "Most important activity at our institution," a "Very important activity," a "Moderately important activity," an "Unimportant activity," or "Does not exist at our institution." Results for the following educational activities are presented in Tables 9 through 13, respectively: "Career training of undergraduates," "Liberal arts education of undergraduates," "Professional education of graduate students," "Liberal arts education of graduate students," and "Adult education." It is clear from these data that undergraduate education is far more important than graduate education at these institutions, in the judgment of their presidents or chancellors. Over 80 percent of the respondents rated career training of undergraduates as either "most important" or "very important." Seventy-five percent of the respondents reported similarly for "liberal arts education of undergraduates." There is very little difference between the importance ascribed to these two activities. In contrast, professional

```
08/25/79            FILE - PRESIDEN - CREATED 08/25/79              PAGE 14

LEVEMP    EDUCATION-LEVEL EMPHASIS OF INSTITUTION

                                                      RELATIVE  ADJUSTED    CUM
                                           ABSOLUTE     FREQ      FREQ      FREQ
CATEGORY LABEL                      CODE     FREQ      (PCT)     (PCT)     (PCT)

UNDER-  GRAD EMP                      1.       85       88.5      88.5      88.5

GRADUATEEMPHASIS                      2.        1        1.0       1.0      89.6

UNDER = GRAD EMP                      3.        8        8.3       8.3      97.9

NO DEGR.GIVEN                         4.        1        1.0       1.0      99.0

ASSOC   DEGREE                        5.        1        1.0       1.0     100.0
                                             ------    ------    ------
                                    TOTAL      96      100.0     100.0
```

Table 7. **Distribution of education level emphasis in 96 minority higher education institutions, Spring, 1979.**

```
08/25/79          FILE - PRESIDEN - CREATED 08/25/79          PAGE 15

LEVEMP    EDUCATION-LEVEL EMPHASIS OF INSTITUTION

     CODE
          I
      1.  ********************************************** (      85)
          I  UNDER-  GRAD EMP
          I
          I
      2.  ** (      1)
          I  GRADUATEEMPHASIS
          I
          I
      3.  ***** (      8)
          I  UNDER = GRAD EMP
          I
          I
      4.  ** (      1)
          I  NO DEGR.GIVEN
          I
          I
      5.  ** (      1)
          I  ASSOC   DEGREE
          I
          I.........I.........I.........I.........I.........I
          0        20        40        60        80       100
          FREQUENCY

EAN            1.250      STD ERR        0.076      MEDIAN         1.065
ODE            1.000      STD DEV        0.740      VARIANCE       0.547
KURTOSIS       9.276      SKEWNESS       3.066      RANGE          4.000
MINIMUM        1.000      MAXIMUM        5.000

VALID CASES       96      MISSING CASES      0
```

Table 8. Histogram of education level emphasis in 96 minority higher education institutions, Spring, 1979.

```
08/25/79          FILE - PRESIDEN - CREATED 08/25/79          PAGE  16

ACTCT      IMPORTANCE CAREER TRAINING UNDERGRAD

     CODE
           I
        1. ****************************** (     29)
           I  MOST     IMPORT.
           I
           I
        2. ************************************************* (     48)
           I  VERY     IMPORT.
           I
           I
        3. *************** (     14)
           I  MODERATEIMPORT.
           I
           I
        4. ** (      1)
           I  UNIMPORT-ANT
           I
           I
        5. **** (      3)
           I  DOES NOT EXIST
           I
           I
      999. ** (      1)
 (MISSING) I
           I
           I.........I.........I.........I.........I.........I
           0        10        20        30        40        50
           FREQUENCY

MEAN            1.958       STD ERR         0.091       MEDIAN          1.885
MODE            2.000       STD DEV         0.886       VARIANCE        0.785
KURTOSIS        2.696       SKEWNESS        1.301       RANGE           4.000
MINIMUM         1.000       MAXIMUM         5.000

VALID CASES        95       MISSING CASES       1
```

Table 9. Histogram of reported importance of career training of undergraduates in 95 minority higher education institutions, Spring, 1979.

```
ACTLAU    IMPORTANCE LIBERAL ARTS FOR UNDERGRAD

      CODE
            I
         1. ********************************** (     33)
            I  MOST    IMPORT.
            I
            I
         2. ***************************************** (     40)
            I  VERY    IMPORT.
            I
            I
         3. ****************** (     17)
            I  MODERATEIMPORT.
            I
            I
         4. ** (      1)
            I  UNIMPORT-ANT
            I
            I
         5. ****** (      5)
            I  DOES NOT EXIST
            I
            I.........I.........I.........I.........I.........I
            0        10        20        30        40        50
            FREQUENCY

 EAN         2.010      STD ERR       0.104     MEDIAN        1.875
 ODE         2.000      STD DEV       1.021     VARIANCE      1.042
KURTOSIS     1.713      SKEWNESS      1.252     RANGE         4.000
 INIMUM      1.000      MAXIMUM       5.000

VALID CASES     96      MISSING CASES     0
```

Table 10. Histogram of reported importance of liberal arts education of undergraduates in 96 minority higher education institutions, Spring, 1979.

education of graduate students does not exist at two-thirds of the institutions, and liberal arts education of graudate students is missing at fully three-fourths of the institutions. The former of these activities was judged to be "most important" or "very important" in less than 20 percent of the institutions, and the latter activity was so classified in only 10 percent of the institutions. Adult education was judged to be "most important" or "very important" in over 40 percent of the institutions, and at least "moderately important" in almost 80 percent. However, adult education does not take place in nearly 18 percent of the institutions.

Presidents or chancellors were given the opportunity to specify other educational activities that were of importance in their institutions, and a wide range of responses resulted. No more than four presidents or chancellors listed such activities as nursing education, technical-vocational education, Christian education, remedial education, ethnic education, and pre-college education. Eight respondents listed continuing education as being at least "moderately important" in their institutions.

As mentioned earlier, to gauge the institutions' press for faculty research and publication, both presidents or chancellors and vice presidents or deans were asked to specify the faculty accomplishments given greatest consideration when faculty are considered for promotion. As with other questions posed to both types of respondent, more-complete data were provided by presidents or chancellors, and the responses of both types of respondent had very similar distributions. Therefore only the responses of presidents or chancellors will be considered here. Three options, in addition to an "other" category were provided on the questionnaire. Seventy-one presidents or chancellors (74 percent) indicated that at their institution, when a faculty member is considered for promotion, "Teaching performance is given greatest consideration."

```
ACTPE      IMPORTANCE PROFESSIONAL EDUC GRAD STUD

      CODE
             I
        1.   ****  (      5)
             I  MOST     IMPORT.
             I
             I
        2.   ********  (     14)
             I  VERY     IMPORT.
             I
             I
        3.   ********  (     13)
             I  MODERATEIMPORT.
             I
             I
        5.   ********************************  (     64)
             I  DOES NOT EXIST
             I
             I.........I.........I.........I.........I.........I
             0        20        40        60        80       100
             FREQUENCY

MEAN              4.083      STD ERR         0.139      MEDIAN          4.750
MODE              5.000      STD DEV         1.366      VARIANCE        1.867
KURTOSIS         -0.591      SKEWNESS       -1.013      RANGE           4.000
MINIMUM           1.000      MAXIMUM         5.000

VALID CASES          96      MISSING CASES       0
```

Table 11. Histogram of reported importance of professional education of graduate students in 96 minority higher education institutions, Spring, 1979.

```
08/25/79             FILE - PRESIDEN - CREATED 08/25/79              PAGE  20

ACTLAG     IMPORTANCE LIBERAL ARTS FOR GRAD STUD

        CODE
              I
           2. ****** (     10)
              I  VERY     IMPORT.
              I
              I
           3. ******** (     13)
              I  MODERATEIMPORT.
              I
              I
           4. ** (      1)
              I  UNIMPORT-ANT
              I
              I
           5. ************************************* (     72)
              I  DOES NOT EXIST
              I
              I.........I.........I.........I.........I.........I
              0        20        40        60        80       100
              FREQUENCY


MEAN             4.406      STD ERR          0.109      MEDIAN           4.833
MODE             5.000      STD DEV          1.072      VARIANCE         1.149
KURTOSIS         0.258      SKEWNESS        -1.401      RANGE            3.000
MINIMUM          2.000      MAXIMUM          5.000

VALID CASES         96      MISSING CASES        0
```

Table 12. Histogram of reported importance of liberal arts education of graduate students in 96 minority higher education institutions, Spring, 1979

```
08/25/79           FILE - PRESIDEN - CREATED 08/25/79              PAGE 21

ACTAE      IMPORTANCE OF ADULT EDUCATION


     COUE
             I
        1.   ******* (      6)
             I  MOST    IMPORT.
             I
             I
        2.   ************************************ (     34)
             I  VERY    IMPORT.
             I
             I
        3.   ************************************** (     36)
             I  MODERATEIMPORT.
             I
             I
        4.   **** (     3)
             I  UNIMPORT-ANT
             I
             I
        5.   ****************** (     17)
             I  DOES NOT EXIST
             I
             I.........I.........I.........I.........I.........I
             0        10        20        30        40        50
             FREQUENCY

 EAN          2.906     STD ERR       0.119     MEDIAN        2.722
 OUE          3.000     STD DEV       1.161     VARIANCE      1.349
KURTOSIS     -0.428     SKEWNESS      0.639     RANGE         4.000
MINIMUM       1.000     MAXIMUM       5.000

VALID CASES      96     MISSING CASES     0
```

Table 13. Histogram of reported importance of adult education in 96 minority higher education institutions, Spring, 1979.

Only one indicated that "published research is given greatest consideration," and seven (7.3 percent) indicated that "Teaching and published research are considered equally." The "other" category produced the following responses: Eight presidents or chancellors indicated that faculty ranks are not differentiated at their institutions, and the question therefore did not apply to them. Five indicated that faculty were promoted on the basis of a combination of teaching and service performance. In two institutions, faculty promotion was handled as part of a collective bargaining agreement. Finally, "practical experience" was given greatest consideration in one institution.

In summary then, the institutions represented by responding presidents or chancellors appear to impose little pressure on their faculty, through promotion consideration, to publish or do research. This finding is consistent with the orientation of these institutions toward undergraduate education, and a broad mixture of arts and science emphases.

C. Education in the Sciences

Academic vice presidents or deans were asked three types of questions about education in the sciences at their institutions. The first concerned the existence of such education in terms of courses and/or degree offerings. The second concerned the extensiveness of educational offerings in the sciences. And the third concerned the productivity of the institution in terms of numbers of science graduates at various degree levels. These areas will be discussed in order.

Eighty of 82 vice presidents or deans (almost 98 percent) reported that some science courses were offered at their institutions. Forty of 76 responding deans (53 percent) reported that their institutions offered a minor in science, and the numbers reporting offerings of science degrees at various levels ranging from associate to the doctorate are shown in Table 14. These data

Degree in the Sciences	Number of VP's or Deans Reporting Degree is Offered	Percent of Responding VP's or Deans Reporting Degree is Offered
Associate	41	53.2
Bachelor	41	53.2
Master	13	17.3
Doctor	5	6.8

Table 14. Number and percent of academic vice presidents or deans in minority institutions of higher education reporting offerings of degrees in the sciences, by level, Spring, 1979.

reveal that undergraduate degrees in the sciences are offered in over half of the minority institutions with responding deans, and that graduate degrees in the sciences are offered in relatively few institutions.

The size of the science program in these minority institutions was assessed in a variety of ways. First, vice presidents or deans were asked to report the total number of science majors enrolled in their institution, by major category. Data reported in Tables 15 and 16 suggest that the number of majors in the sciences, like total number of faculty employed, varied widely across minority institutions. Over 40 percent of the institutions had fewer than 100 science majors, but slightly over ten percent had more than 1000 such majors. This latter figure represents only eight reporting institutions, however.

Although an institution might not have a large number of students majoring in the sciences, its science program might still be extensive. It might have a large number of students enrolled in science courses; its course offerings in the sciences might be quite varied; and the size of its science faculty might be large. Academic vice presidents or deans were asked to report the total enrollment in science classes at their institutions, by category, at the time of the survey. Their responses are summarized in Tables 17 and 18. Once again, we see evidence of wide variation in the size of the science programs at the respondents' institutions. Almost 10 percent of the institutions report 50 or fewer students enrolled in science courses, but more than 50 percent of the institutions report having at least 500 students so enrolled. Tables 19 and 20 contain the reports of academic vice presidents or deans on the number of different science courses offered in 77 minority institutions during the 1978-79 academic year. While almost 12 percent of these institutions offered no more than five different science courses, almost 45 percent offered more than 30, and over 60 percent offered at least 21. It would appear that a diverse set

```
08/25/79          FILE - DEANS     - CREATED 08/25/79            PAGE 25

ENRMAJ    NUMBER SCIENCE MAJORS ENROLLED

                                                RELATIVE  ADJUSTED   CUM
                                      ABSOLUTE    FREQ      FREQ     FREQ
CATEGORY LABEL               CODE       FREQ     (PCT)     (PCT)    (PCT)

0-50                           1.         25      30.1      32.1     32.1

51-100                         2.          9      10.8      11.5     43.6

101-250                        3.         12      14.5      15.4     59.0

251-500                        4.         18      21.7      23.1     82.1

501-1000                       5.          6       7.2       7.7     89.7

> 1000                         6.          8       9.6      10.3    100.0

                             999.          5       6.0   MISSING    100.0
                                      ------    ------    ------
                            TOTAL         83     100.0     100.0
```

Table 15. Distribution of numbers of science majors in 78 minority higher education institutions, Spring, 1979.

```
ENRMAJ    NUMBER SCIENCE MAJORS ENROLLEC

       CODE
                I
          1.    ************************* (     25)
                I  0-50
                I
                I
          2.    ********* (      9)
                I  51-100
                I
                I
          3.    ************ (     12)
                I  101-250
                I
                I
          4.    ****************** (     18)
                I  251-500
                I
                I
          5.    ****** (      6)
                I  501-1000
                I
                I
          6.    ******** (      8)
                I  > 1000
                I
                I
        999.    ***** (      5)
   (MISSING)    I
                I
                I.........I.........I.........I.........I.........I
                0        10        20        30        40        50
                FREQUENCY

MEAN             2.936      STD ERR        0.193      MECIAN         2.917
MODE             1.000      STD DEV        1.701      VARIANCE       2.892
KURTOSIS        -1.114      SKEWNESS       0.314      RANGE          5.000
MINIMUM          1.000      MAXIMUM        6.000

VALID CASES         78      MISSING CASES      5
```

Table 16. Histogram of number of science majors in 78 minority higher education institutions, Spring, 1979.

```
SCIENR     TOTAL SCIENCE CLASSES ENROLLMENT

                                                 RELATIVE   ADJUSTED    CUM
                                      ABSOLUTE     FREQ       FREQ      FREQ
CATEGORY LABEL                  CODE    FREQ       (PCT)      (PCT)     (PCT)

0-50                              1.       7        8.4        9.0       9.0

51-100                            2.       9       10.8       11.5      20.5

101-250                           3.      12       14.5       15.4      35.9

251-500                           4.       9       10.8       11.5      47.4

501-1000                          5.      13       15.7       16.7      64.1

≥ 1000                            6.      28       33.7       35.9     100.0

                                999.       5        6.0     MISSING    100.0
                                       ------     ------     ------
                               TOTAL      83      100.0      100.0
```

Table 17. Distribution of total enrollment in science classes in 78 minority higher education institutions, Spring, 1979.

```
08/25/79          FILE - DEANS     - CREATED 08/25/79          PAGE   28

SCIENM     TOTAL SCIENCE CLASSES ENROLLMENT

      CODE
              I
        1.    ******* (       7)
              I  0-50
              I
              I
        2.    ********* (       9)
              I  51-100
              I
              I
        3.    ************ (      12)
              I  101-250
              I
              I
        4.    ********* (       9)
              I  251-500
              I
              I
        5.    ************* (      13)
              I  501-1000
              I
              I
        6.    **************************** (      28)
              I  > 1000
              I
              I
      999.    ***** (       5)
 (MISSING)    I
              I
              I.........I.........I.........I.........I.........I
              0        10        20        30        40        50
              FREQUENCY

MEAN            4.231      STD ERR        0.196      MEDIAN          4.654
MODE            6.000      STD DEV        1.735      VARIANCE        3.011
KURTOSIS       -1.120      SKEWNESS      -0.504      RANGE           5.000
MINIMUM         1.000      MAXIMUM        6.000

VALID CASES        78      MISSING CASES      5
```

Table 18. Histogram of total enrollment in science classes in 78 minority higher education institutions, Spring, 1979.

```
DSC78      N DIFFERENT SCIENCE COURSES 78-79

                                                 RELATIVE  ADJUSTED    CUM
                                       ABSOLUTE    FREQ      FREQ      FREQ
CATEGORY LABEL                  CODE     FREQ      (PCT)     (PCT)     (PCT)

0-5                               1.        9      10.8      11.7      11.7

6-10                              2.       11      13.3      14.3      26.0

11-20                             3.       10      12.0      13.0      39.0

21-30                             4.       13      15.7      16.9      55.8

> 30                              5.       34      41.0      44.2     100.0

                                999.        6       7.2   MISSING     100.0
                                         ------    ------    ------
                               TOTAL       83     100.0     100.0
```

Table 19. Distribution of number of different courses in the sciences offered during the 1978-79 academic year at 77 minority higher education institutions.

```
DSC/8      N DIFFERENT SCIENCE COURSES 78-79


      CODE
             I
         1.  ********** (       9)
             I  0-5
             I
             I
         2.  ************ (       11)
             I  6-10
             I
             I
         3.  *********** (       10)
             I  11-20
             I
             I
         4.  ************** (       13)
             I  21-30
             I
             I
         5.  *********************************** (       34)
             I  > 30
             I
             I
       999.  ******* (       6)
  (MISSING)  I
             I
             I.........I.........I.........I.........I.........I
             0        10        20        30        40        50
             FREQUENCY


MEAN             3.675      STD ERR         0.166      MEDIAN          4.154
MODE             5.000      STD DEV         1.455      VARIANCE        2.117
KURTOSIS        -1.042      SKEWNESS       -0.648      RANGE           4.000
MINIMUM          1.000      MAXIMUM         5.000

VALID CASES         77      MISSING CASES       6
```

Table 20. Histogram of number of different courses in the sciences offered during the 1978-79 academic year at 77 minority higher education institutions.

of offerings in the sciences exists at a majority of these responding institutions. Consistent with these data are reports of vice presidents or deans on the numbers of total faculty and full-time equivalent faculty employed in the sciences during the 1978-79 academic year. From data shown in Tables 21 and 22, we see that almost 45 percent of 78 responding institutions had at least 21 full-time science faculty members employed during that year, and that almost 40 percent of 77 reporting institutions had at least 21 full-time equivalent faculty so employed. However, diversity is still apparent since almost 40 percent of these institutions had no more than 10 science faculty during the 1978-79 academic year, either employed full time or as full-time equivalents.

To assess the productivity of minority higher education institutions in education in the sciences, academic vice presidents or deans were asked to report the numbers of graduates of their institutions with degrees or majors in a science field, during the five academic years 1973-74 through 1978-79. Their responses are summarized in Tables 23 through 26 for the degree levels, associate, bachelor, master, and doctorate, respectively. Production of associate degrees is not as high as might be expected. Only 41 of the 83 institutions for which vice presidents or deans provided data award the associate degree in the sciences. Of these, 61 percent awarded no more than 50 associate degrees during the five year period from 1973-74 through 1978-79. However, three institutions awarded more than 1000 associate degrees in the sciences during this period. At the bachelors degree level, the distribution of number of awards is far more uniform across the 41 minority institutions reported to offer such degrees. The modal frequency (ten institutions, or 23.8 percent of the minority institutions reported to award the bachelors degree in a science field) appears in the 251-to-500-degrees category of Table 24. Of the thirteen minority institutions reported to award the masters degree

```
SFFT78     NUM FULLTIME FACULTY IN SCIENCE 78-79

        CODE
              I
          1.  ******************************** (     32)
              I  0-10
              I
              I
          2.  *********** (     11)
              I  11-20
              I
              I
          3.  ****************** (     18)
              I  21-50
              I
              I
          4.  ***************** (     17)
              I  > 50
              I
              I
        999.  ***** (      5)
   (MISSING)  I
              I
              I.........I.........I.........I.........I.........I
              0        10        20        30        40        50
              FREQUENCY

MEAN            2.256      STD ERR        0.137      MEDIAN          2.136
MODE            1.000      STD DEV        1.211      VARIANCE        1.466
KURTOSIS       -1.537      SKEWNESS       0.254      RANGE           3.000
MINIMUM         1.000      MAXIMUM        4.000

VALID CASES        78      MISSING CASES      5
```

Table 21. Histogram of number of full time teaching faculty in the sciences employed during the 1978-79 academic year in 78 minority higher institutions.

```
SFTE78    FACULTY IN SCIENCE 78-79

        CODE
                I
          1.   ****************************** (     30)
                I  0-10
                I
                I
          2.   ************** (     14)
                I  11-20
                I
                I
          3.   ****************** (     18)
                I  21-50
                I
                I
          4.   *************** (     15)
                I  > 50
                I
                I
        999.   ****** (      6)
  (MISSING)    I
                I
                I.........I.........I.........I.........I.........I
                0        10        20        30        40        50
                FREQUENCY

 EAN          2.234     STD ERR       0.133     MEDIAN        2.107
 ODE          1.000     STD DEV       1.169     VARIANCE      1.366
KURTOSIS     -1.429     SKEWNESS      0.290     RANGE         3.000
MINIMUM       1.000     MAXIMUM       4.000

VALID CASES      77     MISSING CASES     6
```

Table 22. Histogram of number of full time equivalent faculty in the sciences employed during the 1978-79 academic year in 77 minority higher education institutions.

```
SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79

     CODE
             I
        1.   ************************** (     25)
             I  0-50
             I
             I
        2.   ***** (      4)
             I  51-100
             I
             I
        3.   ****** (      6)
             I  101-250
             I
             I
        4.   **** (      3)
             I  251-500
             I
             I
        6.   **** (      3)
             I    > 1000
             I
             I
      999.   ******************************************** (     42)
  (MISSING)  I
             I
             I.........I.........I.........I.........I.........I
             0        10        20        30        40        50
            FREQUENCY

MEAN            1.976     STD ERR       0.236     MEDIAN        1.320
MODE            1.000     STD DEV       1.508     VARIANCE      2.274
KURTOSIS        1.627     SKEWNESS      1.560     RANGE         5.000
MINIMUM         1.000     MAXIMUM       6.000

VALID CASES        41     MISSING CASES    42
```

Table 23. Distribution of number of associate degrees in a science field awarded during the academic years 1973-74 to 1978-79 by 41 minority higher education institutions.

```
08/25/79          FILE - DEANS      - CREATED 08/25/79              PAGE   35

SCIBS      NUM SCIENCE BACHELOR DEGREES 74-79

        CODE
             I
          1. ******** (      8)
             I  0-50
             I
             I
          2. *** (      3)
             I  51-100
             I
             I
          3. ********* (      9)
             I  101-250
             I
             I
          4. ********** (      10)
             I  251-500
             I
             I
          5. ******* (      7)
             I  501-1000
             I
             I
          6. ***** (      5)
             I   >1000
             I
             I
        999. ***************************************** (     41)
   (MISSING) I
             I
             I.........I.........I.........I.........I.........I
             0        10        20        30        40        50
             FREQUENCY

MEAN              3.476      STD ERR         0.251      MEDIAN          3.600
MODE              4.000      STD DEV         1.627      VARIANCE        2.646
KURTOSIS         -0.987      SKEWNESS       -0.152      RANGE           5.000
MINIMUM           1.000      MAXIMUM         6.000

VALID CASES          42      MISSING CASES      41
```

Table 24. Distribution of number of bachelor degrees in a science field awarded during the academic years 1973-74 to 1978-79 by 42 minority higher education institutions.

in a science field, seven institutions awarded more than 100 during the five-academic-year span (Table 25). However, six such institutions awarded no more than 50 masters degrees in the sciences during the same time period. From the data shown in Table 26, it appears that minority higher education institutions awarded very few doctorates in science fields during the five years 1973-74 through 1978-79. One academic vice president or dean reported that somewhere between 26 and 50 doctorates were awarded over the period, and six others reported that no more than 10 doctorates were awarded. When considering the data in Tables 23 through 26, the reader should keep in mind the numbers of institutions that award degrees at the various levels (Table 14). These figures account for the large numbers of institutions classified in the "Missing" category.

In addition to the traditional degrees just discussed, academic vice presidents or deans were given the opportunity to report the numbers of "other science degrees or certificates" awarded by their institutions during the five academic years 1973-74 through 1978-79. Responses included nine who reported awarding between zero and 50 "other science degrees, level not specified," one who reported awarding between zero and 50 business administration or nursing certificates, and one who reported awarding between 251 and 500 such certificates; two who reported awarding between 51 and 100 "other science certificates;" and two who reported awarding "health services certificates," one in the zero-to-50 category and one in the over-1000 category.

D. Racial and National Origin Compositions of the Institutions

The racial and national origin compositions of 82 minority higher education institutions, as reported by academic vice presidents or deans, are shown in Tables 27 through 33. Although nearly one-fourth of these institutions reported having no black students enrolled, it is clear that blacks compose the largest

```
SCIMS     NUM SCIENCE MASTER DEGREES 74-79

        CODE
              I
          0.  ** (        1)
              I
              I
              I
          1.  *** (       4)
              I  0-10
              I
              I
          3.  ** (        2)
              I  26-50
              I
              I
          4.  ** (        2)
              I  51-100
              I
              I
          5.  ***** (        7)
              I  > 100
              I
              I
        999.  ************************************ (     67)
   (MISSING)  I
              I
              I.........I.........I.........I.........I.........I
              0        20        40        60        80       100
              FREQUENCY

MEAN              3.313     STD ERR          0.472     MEDIAN          4.000
MODE              5.000     STD DEV          1.887     VARIANCE        3.563
KURTOSIS         -1.416     SKEWNESS        -0.585     RANGE           5.000
MINIMUM           0.0       MAXIMUM          5.000

VALID CASES         16      MISSING CASES     67
```

Table 25. Distribution of number of masters degrees in a science field awarded during the academic years 1973-74 to 1978-79 by 16 minority higher education institutions.

```
SCIU      NUMBER SCIENCE DOCTORATES 74-79

      CODE
               I
         0.  ** (        1)
               I
               I
               I
         1.  **** (        6)
               I  0-10
               I
               I
         3.  ** (        1)
               I  26-50
               I
               I
       999.  ****************************************** (      75)
   (MISSING) I
               I
               I.........I.........I.........I.........I.........I
               0        20        40        60        80       100
              FREQUENCY

MEAN          1.125     STD ERR      0.295     MEDIAN      1.000
MODE          1.000     STD DEV      0.835     VARIANCE    0.696
KURTOSIS      4.970     SKEWNESS     1.690     RANGE       3.000
MINIMUM       0.0       MAXIMUM      3.000

VALID CASES       8     MISSING CASES   75
```

Table 26. Distribution of number of doctoral degrees in a science field awarded during the academic years 1973-74 to 1978-79 by 8 minority higher education institutions.

of the minority group populations of these institutions. Thirty-four of the 82 institutions reported less than a majority of enrolled black students, indicating a black student majority in nearly sixty percent of the institutions. In addition, over 40 percent of the institutions reported at least 90 percent black student enrollment (Table 27).

From Table 28 we see that half of the institutions reported no Hispanic student enrollment, three-fourths of the institutions reported less than four percent Hispanic enrollment, five institutions reported between 10 and 37 percent Hispanic enrollment, and 11 institutions reported majority Hispanic student enrollment. If these data are generalizable, sizable concentrations of Hispanic students are to be found in only a few institutions -- nine reported enrollments exceeding 80 percent Hispanic, and only six reported enrollments exceeding 90 percent Hispanic.

Twenty-three of the 82 institutions reported some enrollment of American Indian students, but in 14 of these institutions, enrollment of American Indians was four percent or less. In seven of the 82 institutions (8.5 percent) American Indian enrollment was at least 90 percent, again suggesting concentration of American Indian students in relatively few higher education institutions (Table 29).

Table 30 reports the distribution of enrollment of Eskimo students. Only five institutions reported any Eskimo student enrollment (about six percent of the total reporting institutions). One of these had only one percent Eskimo enrollment, two reported about a third of their students to be Eskimo, and the other two reported Eskimo enrollments of 80 and 90 percent, respectively. High concentration in a few institutions is even more apparent for this group than for some of the other minority groups discussed above.

```
PERBL      PERCENT BLACK STUDENTS

                   ADJ  CUM                     ADJ  CUM                     ADJ  CUM
    CODE     FREQ  PCT  PCT     CODE     FREQ  PCT  PCT     CODE     FREQ  PCT  PCT

      0.       20   24   24      53.        1    1   41      86.        1    1   59
      1.        4    5   29      54.        2    2   44      87.        1    1   60
      4.        1    1   30      56.        1    1   45      90.        5    6   66
      9.        1    1   32      57.        1    1   46      91.        1    1   67
     24.        1    1   33      58.        1    1   48      92.        2    2   70
     30.        1    1   34      60.        4    5   52      95.        4    5   74
     38.        1    1   35      69.        1    1   54      96.        2    2   77
     40.        1    1   37      75.        1    1   55      98.        7    9   85
     47.        2    2   39      77.        1    1   56      99.       11   13   99
     51.        1    1   40      78.        1    1   57     100.        1    1  100

                               M I S S I N G   D A T A
    CODE     FREQ               CODE     FREQ               CODE     FREQ

    999.        1
```

Table 27. Distribution of percent black enrollment at 82 minority higher education institutions, Spring, 1979.

```
PERHISP   PERCENT HISPANIC STUDENTS

                    ADJ CUM                     ADJ CUM                      ADJ CUM
  CODE       FREQ PCT PCT      CODE      FREQ PCT PCT      CODE       FREQ PCT PCT

    0.         41  50  50       10.         1   1  82       81.          1   1  90
    1.         15  18  68       11.         1   1  83       87.          2   2  93
    2.          3   4  72       20.         1   1  84       98.          1   1  94
    3.          2   2  74       21.         1   1  85       99.          3   4  98
    4.          1   1  76       37.         1   1  87      100.          2   2 100
    5.          2   2  78       50.         1   1  88
    6.          2   2  80       58.         1   1  89

                           M I S S I N G   D A T A
  CODE       FREQ              CODE      FREQ              CODE       FREQ

  999.          1
```

Table 28. Distribution of percent Hispanic enrollment at 82 minority higher education institutions, Spring, 1979.

```
PERAMIN   PERCENT AMERIND STUDENTS

                                           RELATIVE  ADJUSTED    CUM
                               ABSOLUTE     FREQ       FREQ      FREQ
CATEGORY LABEL          CODE     FREQ       (PCT)      (PCT)     (PCT)

                          0.       59        71.1       72.0      72.0

                          1.       13        15.7       15.9      87.8

                          4.        1         1.2        1.2      89.0

                         70.        1         1.2        1.2      90.2

                         86.        1         1.2        1.2      91.5

                         90.        1         1.2        1.2      92.7

                         95.        2         2.4        2.4      95.1

                         98.        1         1.2        1.2      96.3

                        100.        3         3.6        3.7     100.0

                        999.        1         1.2    MISSING     100.0
                                 ------     ------     ------
                       TOTAL       83       100.0      100.0
```

Table 29. Distribution of percent American Indian enrollment at 82 minority higher education institutions, Spring, 1979.

```
PERESK     PERCENT ESKIMO STUDENTS

                                         RELATIVE   ADJUSTED     CUM
                             ABSOLUTE      FREQ       FREQ       FREQ
CATEGORY LABEL        CODE     FREQ       (PCT)      (PCT)      (PCT)

                        0.       77        92.8       93.9       93.9

                        1.        1         1.2        1.2       95.1

                       34.        2         2.4        2.4       97.6

                       80.        1         1.2        1.2       98.8

                       90.        1         1.2        1.2      100.0

                      999.        1         1.2    MISSING      100.0
                              -------    -------    -------
                     TOTAL       83       100.0      100.0
```

Table 30. Distribution of percent Eskimo enrollment at 82 minority higher education institutions, Spring, 1979.

Only one institution reported more than a majority of its enrollment to be composed of Asian students (an enrollment of 85 percent — see Table 31). However, 25 more institutions, more than 30 percent of the 82, reported having some enrollment of Asian students, ranging from one percent (nine institutions) to 20 percent. These data suggest a relatively small number of Asian students enrolled in minority higher education institutions, but a fairly wide distribution of students from this national origin group among these institutions.

Like Eskimo students, Alaskan Indian students are not enrolled in almost 94 percent of the 82 reporting minority institutions. Only one institution reported an enrollment of 20 percent Alaskan Indian students, and four more reported enrollments between one and four percent (Table 32). It is clear that this minority group makes up a very small part of the enrollment of these 82 minority higher education institutions.

Academic vice presidents or deans were given the opportunity to report the enrollment of members of "other minority groups" among their student bodies, and such reports were abundant. In nearly 83 percent of the institutions, the enrollment was composed of at least one percent of students from "other minority groups." However, other groups made up a large part of the student body in only a few of the reporting institutions. Data in Table 33 indicate that "other minority groups" composed a majority of the student body in only three institutions, and virtually the entire student body in two of these. A majority of the institutions reported no more than five percent of their students as members of "other minority groups." Sixteen institutions (just under 20 percent) reported between one-fourth and one-half of their students to be members of "other minority groups."

```
08/30/79          FILE - DEANS     - CREATED 08/25/79           PAGE  45

PERASIA   PERCENT ASIAN STUDENTS

                                                 RELATIVE   ADJUSTED     CUM
                                       ABSOLUTE    FREQ       FREQ       FREQ
CATEGORY LABEL                 CODE      FREQ      (PCT)      (PCT)      (PCT)

                                 0.        56       67.5       68.3       68.3

                                 1.         9       10.8       11.0       79.3

                                 2.         6        7.2        7.3       86.6

                                 3.         1        1.2        1.2       87.8

                                 5.         3        3.6        3.7       91.5

                                 6.         1        1.2        1.2       92.7

                                 9.         1        1.2        1.2       93.9

                                10.         2        2.4        2.4       96.3

                                11.         1        1.2        1.2       97.6

                                20.         1        1.2        1.2       98.8

                                85.         1        1.2        1.2      100.0

                               999.         1        1.2    MISSING      100.0
                                         ------     ------     ------
                               TOTAL       83      100.0      100.0
```

Table 31. Distribution of percent Asian enrollment at 82 minority higher education institutions, Spring, 1979.

```
PERALIND  PERCENT ALASKAN INDIAN STUD

                                                RELATIVE   ADJUSTED     CUM
                                     ABSOLUTE     FREQ       FREQ       FREQ
CATEGORY LABEL                CODE     FREQ      (PCT)      (PCT)      (PCT)

                                0.       77       92.8       93.9       93.9

                                1.        1        1.2        1.2       95.1

                                2.        2        2.4        2.4       97.6

                                4.        1        1.2        1.2       98.8

                               20.        1        1.2        1.2      100.0

                              999.        1        1.2     MISSING     100.0
                                     ------     ------     ------
                             TOTAL       83      100.0      100.0
```

Table 32. Distribution of percent Alaskan Indian enrollment at 82 minority higher education institutions, Spring, 1979.

```
PERUTH1   PERCENT OTHER MINORITY 1

                   ADJ  CUM                        ADJ  CUM                        ADJ  CUM
    CODE     FREQ  PCT  PCT       CODE     FREQ    PCT  PCT       CODE     FREQ    PCT  PCT

      0.       14   17   17        14.        2      2   67        36.        1      1   83
      1.       14   17   34        17.        1      1   68        38.        1      1   84
      2.        4    5   39        18.        1      1   70        39.        2      2   87
      3.        1    1   40        19.        1      1   71        40.        2      2   89
      4.        4    5   45        20.        2      2   73        41.        1      1   90
      5.        4    5   50        21.        1      1   74        43.        2      2   93
      6.        1    1   51        23.        1      1   76        46.        1      1   94
      8.        2    2   54        24.        1      1   77        49.        2      2   96
      9.        1    1   55        30.        1      1   78        53.        1      1   98
     10.        3    4   59        32.        1      1   79        99.        1      1   99
     11.        3    4   62        33.        1      1   80       100.        1      1  100
     13.        2    2   65        35.        1      1   82

                               M I S S I N G   D A T A
    CODE     FREQ                 CODE     FREQ                   CODE     FREQ

    999.        1
```

Table 33. Distribution of percent "other minority" enrollment at 82 minority higher education institutions, Spring, 1979.

II. Present Academic Computing Status

Directors of academic computing centers were asked to provide information on the present status of academic computing at their institutions. More specifically, they were asked whether their institutions provide access to computers for academic use, where those computers were located, and how many computers were available to faculty and students in their institutions. They were also asked what kinds of computers were used by their institutions, and to provide manufacturers' names and model numbers. Additional questions covered the availability and numbers of input/output devices, card processing devices, computer languages and packaged programs, and computing personnel. Finally, computing center directors were asked to provide data on the costs of operating their computing centers.

Heads of science departments and directors of academic computing centers were asked about the computing capabilities of students and faculty, the extent to which faculty and students used academic computing facilities, and the kinds of computing tasks faculty and students pursued. Presidents or chancellors, deans or academic vice-presidents and science department heads were asked about attitudes toward academic computing at their institutions.

Responses to these various questions are summarized and discussed in this section. Eight subsections are devoted to information on Hardware and Equipment, Computing Software, Computing Personnel, Dollar Investment in Computing, Extent of Computer Use, Types of Student and Faculty Use of Computing, and Attitudes Toward Academic Computing, respectively.

A. Hardware and Equipment

Fifty-five directors of academic computing centers returned questionnaires on the present status of academic computing at minority higher education institutions. Eighty percent of computing directors reported that computers were available at their institutions for academic computing use. In addition, 84 percent of 83 responding deans or academic vice-presidents and 74 percent of 178 responding science department heads reported that their institutions provide access to academic computing facilities (See Table 34).

Arrangements for access to computers differed widely among responding institutions. Just over half (53%) of directors of academic computing centers whose institutions provide access to computers reported that their institutions use one or more centrally located computers; slightly over one-third (38%) reported that their institutions use a combination of centrally-located computers and personal computers, and the remaining 9 percent reported that only personal computers are available at their institutions. Where the computers used are centrally located, somewhat more than half (56%) of computing directors reported that their central computers are located on campus. About 28 percent of computing directors reported that their central computers are located elsewhere, and about 16 percent reported that their institutions have access to computers located off campus in addition to computing centers on campus. Frequency distributions for responses to these questions are presented in Tables 35 and 36.

A list of the locations of off-campus computing equipment used by minority institutions is given in Table 37. The largest number of computing directors whose institutions use off-campus computers reported access to computers located at the main office of a computer network (46%). Other non-commercial institutions, such as other universities, rank second as the location of off-campus computing centers. One computing center director reports use of computers at both kinds of locations.

The kinds of computers to which computing directors reported access ranged from micro computers to very large central units, and the numbers of

Type of Respondent	Institution has Access to a Computer for Academic Purposes. Number (and percent) responding "yes"
Academic Vice-President or Dean	70 (84)
Science Department Head	131 (74)
Computer Center Director	44 (80)

Table 34. Number and (percent) of 83 deans or academic vice presidents, 178 heads of science departments and 55 directors of academic computing centers in minority higher education institutions reporting that their institutions provide access to computers. Data collected April, 1979.

```
CENCOMP   USE OF CENTRAL OR PERSONAL ACAD COMPUTER

                                                  RELATIVE   ADJUSTED     CUM
                                      ABSOLUTE      FREQ       FREQ       FREQ
CATEGORY LABEL                CODE      FREQ       (PCT)      (PCT)      (PCT)

CENTRAL                         1.        24        43.6       53.3       53.3

PERSONAL                        2.         4         7.3        8.9       62.2

BOTH                            3.        17        30.9       37.8      100.0

                              999.        10        18.2     MISSING     100.0
                                       -------    -------    -------
                              TOTAL       55       100.0      100.0
```

Table 35. Distribution of responses of 55 directors of academic computing centers in minority higher education institutions reporting kinds of computers used by their institutions. Data collected April, 1979.

```
08/30/79          FILE - COMPCENT - CREATED 08/30/79          PAGE 52

CENCAM    CENTRAL ACAD COMPUTER LOCATED ON CAMPUS

                                                 RELATIVE   ADJUSTED    CUM
                                      ABSOLUTE     FREQ       FREQ      FREQ
CATEGORY LABEL                 CODE     FREQ      (PCT)      (PCT)     (PCT)

YES                              1.       24       43.6       55.8      55.8

NO                               2.       12       21.8       27.9      83.7

BOTH ON AND OFF                  3.        7       12.7       16.3     100.0

                               999.       12       21.8    MISSING     100.0
                                      ------     ------     ------
                              TOTAL       55      100.0      100.0
```

Table 36. Distribution of responses of 55 directors of academic computing centers in minority higher education institutions reporting whether computers used by their institutions are located on or off campus, or both. Data collected April, 1979.

Location of Computer	Number (and percent) of Institutions
Commercial Data Processing Company	1 (5)*
Main Office of Computer Network	10 (46)
Other Non-Commer Institution	7 (32)
Main Office of Computer Network and Other Non-Commercial Institution	1 (5)
Commercial Data Processing Company and Other Non-Commercial Institution	1 (5)
Tribal Office	1 (5)
Other (not specified)	1 (5)

Table 37. Distribution of responses of 55 directors of academic computing centers in minority higher education institutions reporting whether computers used by their institutions are located on or off campus, or both. Data collected April, 1979.

* Percent (rounded) or computing center directors who report any use of off-campus computers.

each kind of computer available varied widely across institutions. A summary of responses to questions regarding numbers of computers available is presented in Table 38. Eighty-one percent of computer center directors responding reported that their institutions have access to at least one computer. One director listed seven different units to which his or her institution has access, though the majority reported having access to no more than three different computer models. In general, the number of units of each model available is small, with five computing center directors reporting between three and six units of a given model, and six directors reporting two each of a given model.

Manufacturers of the computer named by computing directors as their first computer are listed in Table 39; the model numbers are listed in Table 40. It can be seen from these lists and the distribution in Table 38 that 90% of the responding computing center directors have reported one large computer unit as their first computer. Manufacturers and model numbers of computers listed as the second through seventh model are given in Tables 41 and 52. Institutions which have access to a second, third and fourth computer have, in most cases, one unit of each of the kind listed, and it is most likely to be a large unit.

The exceptions have already been noted: the one director who listed five units of one model as the second computer, and four directors who report that their institutions have two each of the model they list as their institutions' second computers. Two of the responding computing directors, having already listed other models as their institutions' first and second computers, report that their institutions have three and four apiece of the models they list as third computers. One, in an institution with access to at least five different kinds of computers, notes that his or her institution has access to three units of the kind listed as the fifth unit.

Of the 45 academic computing center directors who reported that their institutions have access to at least one computer, 40 percent reported only one large unit or numerous units of the same micro computer model. Sixty percent reported that their institutions have access to a second computer. Just under one-third of computing center directors reported that their institutions have access to at least three computers, and 15 percent reported having access to at least four different computers. One director reported a sixth and seventh model number.

Fifty-two different computer models were listed as being in use at the minority institutions surveyed. Three manufacturers produced 56 percent of the models used. IBM manufactured 29 percent of the model numbers listed. DEC produced 17 percent, and Hewlett Packard manufactured 10 percent. Eighteen other manufacturers accounted for the remaining 44 percent, with one or two models each. No single model made by any manufacturer is in use at more than two or three of the responding institutions.

Directors of academic computer centers were asked whether various input/output devices were available to faculty or students at their institutions. The majority of the computing directors whose institutions have access to computers responded that their institutions make at least some input/output equipment available to faculty and students for academic computing purposes. A listing of input/output devices and the number and percent of academic computing center directors who report the availability of these devices are shown in Table 53. The devices reported to be available by most computing center directors are line printers (86% reported having this device), card readers (80%), teletypes or printing terminals (76%) and simple video display

Number of Computer Units	Number of Academic Computing Center Directors Reporting Given Numbers of Computer Units as First through Seventh Computers						
	First Computer	Second Computer	Third Computer	Fourth Computer	Fifth Computer	Sixth Computer	Seventh Computer
1	42	22	12	7	1	1	1
2	2	4					
3			1		1		
4			1				
5		1					
6	1						

Table 38. Distribution of number of units of first through seventh computers reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

```
COMMFR1   MANUFACTURER OF ACAD COMPUTER-1

                                         RELATIVE   ADJUSTED     CUM
                               ABSOLUTE    FREQ       FREQ       FREQ
CATEGORY LABEL          CODE     FREQ      (PCT)      (PCT)      (PCT)

AMDAHL                    2.        2       3.6        4.4        4.4

BURROUGH                  5.        1       1.8        2.2        6.7

DATA GEN                 12.        1       1.8        2.2        8.9

DATAPOIN                 13.        1       1.8        2.2       11.1

DEC                      16.       11      20.0       24.4       35.6

BON                      18.        1       1.8        2.2       37.8

                         23.        1       1.8        2.2       40.0

HP                       28.        6      10.9       13.3       53.3

IBM                      36.       16      29.1       35.6       88.9

UNIVAC                   68.        1       1.8        2.2       91.1

WANG                     88.        1       1.8        2.2       93.3

  RUX                    92.        1       1.8        2.2       95.6

SERVBUR                  98.        1       1.8        2.2       97.8

UNKNOWN                  99.        1       1.8        2.2      100.0

                        999.       10      18.2    MISSING      100.0
                                ------    ------     ------
                       TOTAL       55     100.0      100.0
```

Table 39. Distribution of number of computers made by various manufacturers listed by 55 directors of academic computing centers in minority higher education institutions as their first computer. Data collected April, 1979.

Model Number, Academic Computer Number One	Number of Computer Units
IBM SYS 3/10	2
IBM SYS 360/40	1
IBM SYS 360/50	1
IBM SYS 370/115	2
IBM SYS 370/135	2
IBM SYS 370/145	1
IBM SYS 370/148	1
IBM SYS 370/168	2
IBM 1130	3
IBM 3033	1
UNIVAC 9480	1
ECLIPSE C/300	1
DON 74	1
DEC 10	1
DEC 1090	1
DEC PDP-11.34	3
DEC PDP-11.40	1
DEC PDP-11.10	2
HP 2000 Access	1
HP 3000	2
HP 9845	1
HP 2100	1
WANG 2200	1
Burroughs 1860	1
(Intdata) 7932	1
AMDAHL 470.V.6	1
AMDAHL 470.V.5	1
DATAPOINT 2200	1
(Names missing)	3

Table 40. Distribution of number of computers, by model, listed by 55 directors of academic computing centers in minority higher education institutions as their first computer. Data collected April, 1979.

```
COMMFR2   MANUFACTURER OF ACAD COMPUTER-2

                                               RELATIVE   ADJUSTED    CUM
                                    ABSOLUTE     FREQ       FREQ      FREQ
CATEGORY LABEL              CODE      FREQ      (PCT)      (PCT)     (PCT)

APPLE                         1.         1        1.8        3.7       3.7

CDC                           7.         1        1.8        3.7       7.4

DATAPOIN                     13.         1        1.8        3.7      11.1

DEC                          16.         5        9.1       18.5      29.6

HP                           28.         5        9.1       18.5      48.1

IBM                          36.         8       14.5       29.6      77.8

RADSHAK                      55.         1        1.8        3.7      81.5

WANG                         88.         1        1.8        3.7      85.2

XEROX                        92.         1        1.8        3.7      88.9

UNKNOWN                      99.         3        5.5       11.1     100.0

                            999.        28       50.9     MISSING    100.0
                                    ------     ------     ------
                           TOTAL        55      100.0      100.0
```

Table 41. Distribution of number of computers made by various manufacturers listed by 55 directors of academic computing centers in minority higher education institutions as their second computer. Data collected April, 1979.

Model Number, Academic Computer Number Two	Number of Computer Units
IBM SYS 370/158	2
IBM 1620	1
IBM 1130	2
IBM 3031	1
IBM 5100	1
DEC PDP-8E	2
DEC PDP-8C	1
DEC PDP-11.70	2
HP 2000	3
HP 2000 Access	1
HP Z1M10	1
WANG 2200	1
CDC Cyber 73	1
Apple II	1
RadioShack TRS-80	1
BASIC 4	1
DATAPOINT 2200	1
XEROX 530	1

Table 42. Distribution of number of computers, by model, listed by 55 directors of academic computing centers in minority higher education institutions as their second computer. Data collected April, 1979.

```
08/30/79        FILE - COMPCENT - CREATED 08/30/79              PAGE 61

COMMFR3   MANUFACTURER OF ACAD COMPUTER-3

                                                RELATIVE  ADJUSTED    CUM
                                      ABSOLUTE    FREQ      FREQ      FREQ
CATEGORY LABEL                 CODE     FREQ      (PCT)     (PCT)     (PCT)

AMDAHL                           2.        1       1.8       7.1       7.1

DEC                             16.        1       1.8       7.1      14.3

HP                              28.        1       1.8       7.1      21.4

IBM                             36.        6      10.9      42.9      64.3

NCR                             48.        1       1.8       7.1      71.4

RADSHAK                         55.        1       1.8       7.1      78.6

SOL                             60.        1       1.8       7.1      85.7

TEKTRONX                        64.        1       1.8       7.1      92.9

XDS                             91.        1       1.8       7.1     100.0

                               999.       41      74.5   MISSING     100.0
                                      ------    ------    ------
                              TOTAL       55     100.0     100.0
```

Table 43. Distribution of number of computers made by various manufacturers listed by 55 directors of academic computing centers in minority high education institutions as their third computer. Data collected April, 1979.

```
08/30/79          FILE - COMPCENT - CREATED 08/30/79            PAGE  62

COMMDL3   MODEL NO. ACAD COMPUTER-3

                                                  RELATIVE   ADJUSTED     CUM
                                      ABSOLUTE      FREQ       FREQ       FREQ
CATEGORY LABEL                 CODE     FREQ       (PCT)      (PCT)      (PCT)

IBM SYS 370,148                 25.        1        1.8        7.1        7.1

IBM SYS 370,168                 28.        1        1.8        7.1       14.3

IBM SYS 360, 370                29.        1        1.8        7.1       21.4

IBM1130                         32.        1        1.8        7.1       28.6

IBM5100                         37.        2        3.6       14.3       42.9

DEC PDP-11                      79.        1        1.8        7.1       50.0

NCR 200                         88.        1        1.8        7.1       57.1

TEKTR.  4051                    92.        1        1.8        7.1       64.3

HP 2000 ACCESS                  96.        1        1.8        7.1       71.4

XDS      SIGMA 7               112.        1        1.8        7.1       78.6

AMDAHL 470.V.6                 126.        1        1.8        7.1       85.7

RADSHAKTRS-80                  142.        1        1.8        7.1       92.9

SOL 2000                       145.        1        1.8        7.1      100.0

UNKNOWN                        999.       41       74.5    MISSING      100.0
                                      ------     ------     ------
                              TOTAL       55      100.0      100.0
```

Table 44. Distribution of number of computers, by model, listed by 55 directors of academic computing centers in minority higher education institutions as their third computer. Data collected April, 1979.

```
COMMFR4   MANUFACTURER OF ACAD COMPUTER-4

                                         RELATIVE  ADJUSTED    CUM
                               ABSOLUTE    FREQ      FREQ      FREQ
CATEGORY LABEL          CODE     FREQ      (PCT)     (PCT)     (PCT)

AMDAHL                    2.        1        1.8      14.3      14.3

CDC                       7.        1        1.8      14.3      28.6

DEC                      16.        1        1.8      14.3      42.9

IMSAI                    37.        1        1.8      14.3      57.1

RADSHAK                  55.        1        1.8      14.3      71.4

SWTP                     62.        1        1.8      14.3      85.7

WANG                     88.        1        1.8      14.3     100.0

                        999.       48       87.3   MISSING     100.0
                                 ------   ------    ------
                        TOTAL      55      100.0     100.0
```

Table 45. Distribution of number of computers made by various manufacturers listed by 55 directors of academic computing centers in minority higher education institutions as their fourth computer. Data collected April, 1979.

```
COMMDL4   MODEL NO ACADEMIC COMPUTER-4

                                                RELATIVE  ADJUSTED     CUM
                                      ABSOLUTE    FREQ      FREQ      FREQ
CATEGORY LABEL                 CODE     FREQ      (PCT)     (PCT)     (PCT)

DEC PDP-11.35                   83.        1        1.8      16.7      16.7

WANG2200                       102.        1        1.8      16.7      33.3

AMDAHL 470.V.6                 126.        1        1.8      16.7      50.0

IMSAI 8080                     141.        1        1.8      16.7      66.7

RADSHAKTRS-80                  142.        1        1.8      16.7      83.3

SWTP6800                       147.        1        1.8      16.7     100.0

UNKNOWN                        999.       49       89.1   MISSING     100.0
                                      -------    -------   -------
                              TOTAL       55      100.0     100.0
```

Table 46. Distribution of number of computers, by model, listed by 55 directors of academic computing centers in minority higher education institutions as their fourth computer. Data collected April, 1979.

```
COMMFR5   MANUFACTURER OF ACAD COMPUTER-5

                                                  RELATIVE   ADJUSTED     CUM
                                       ABSOLUTE     FREQ       FREQ       FREQ
CATEGORY LABEL                  CODE     FREQ       (PCT)      (PCT)      (PCT)

RADSHAK                          55.        1         1.8       50.0       50.0

TEKTRONX                         64.        1         1.8       50.0      100.0

                                999.       53        96.4    MISSING      100.0
                                       -------     ------     ------
                               TOTAL       55       100.0      100.0
```

Table 47. Distribution of number of computers made by various manufacturers listed by 55 directors of academic computing centers in minority higher education institutions as their fifth computer. Data collected April, 1979.

```
COMMDL5   MODEL NO. ACAD COMPUTER-5

                                                     RELATIVE   ADJUSTED    CUM
                                          ABSOLUTE     FREQ       FREQ      FREQ
CATEGORY LABEL                     CODE     FREQ      (PCT)      (PCT)     (PCT)

TEKIR.  4051                        92.        1        1.8       50.0      50.0

RADSHAKTRS-80                      142.        1        1.8       50.0     100.0

UNKNOWN                            999.       53       96.4    MISSING     100.0
                                           ------     ------     ------
                                  TOTAL       55      100.0      100.0
```

Table 48. Distribution of number of computers, by model, listed by 55 directors of academic computing centers in minority higher education institutions as their fifth computer. Data collected April, 1979.

```
COMMFR6   MANUFACTURER OF ACAD COMPUTER-6

                                                    RELATIVE   ADJUSTED     CUM
                                        ABSOLUTE      FREQ       FREQ       FREQ
CATEGORY LABEL                    CODE      FREQ      (PCT)      (PCT)      (PCT)

APPLE                               1.         1        1.8      100.0      100.0

                                  999.        54       98.2    MISSING      100.0
                                          ------     ------     ------
                                 TOTAL        55      100.0      100.0
```

Table 49. Distribution of number of computers made by various manufacturers listed by 55 directors of academic computing centers in minority higher education institutions as their sixth computer. Data collected April, 1979.

COMMDL6 MODEL NO. ACAD COMPUTER-6

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
APPLE II	140.	1	1.8	100.0	100.0
UNKNOWN	999.	54	98.2	MISSING	100.0
	TOTAL	55	100.0	100.0	

Table 50. Distribution of number of computers, by model, listed by 55 directors of academic computing centers in minority higher education institutions as their sixth computer. Data collected April, 1979.

COMMFR7 MANUFACTURER OF ACAD COMPUTER-7

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
IMSAI	37.	1	1.8	100.0	100.0
	999.	54	98.2	MISSING	100.0
	TOTAL	55	100.0	100.0	

Table 51. Distribution of number of computers made by various manufacturers listed by 55 directors of academic computing centers in minority higher education institutions as their seventh computer. Data collected April, 1979.

```
08/30/79          FILE - COMPCENT - CREATED 08/30/79              PAGE 70

COMMDL7   MODEL NO ACAD COMPUTER-7

                                                 RELATIVE  ADJUSTED    CUM
                                       ABSOLUTE    FREQ      FREQ      FREQ
CATEGORY LABEL                  CODE     FREQ     (PCT)     (PCT)     (PCT)

IMSAI 8080                      141.        1       1.8     100.0     100.0

UNKNOWN                         999.       54      98.2   MISSING     100.0
                                       ------    ------    ------
                                TOTAL      55     100.0     100.0
```

Table 52. Distribution of number of computers, by model, listed by 55 directors of academic computing centers in minority higher education institutions as their seventh computer. Data collected April, 1979.

terminals (76%). Just over half of the computing center directors (53%) indicated that magnetic tape drive units are available, and just under half (48%) reported that faculty and students at their institutions have access to an on-line card punch. Punched paper tape readers or punches were reported to be available by 36 percent of computing center directors. Less commonly available equipment includes graphic video display terminals and on-line plotters (Each reported to be available by 27% of computing center directors in institutions that have computers), and optical character scanners (Available in 21% of institutions that have access to a computer). Only one computing center director reported that a disc storage unit can be used by faculty and students at his or her institution, and one reported a Radio Shack unit available.

Computer center directors reported large differences in the numbers of input/output devices available at their institutions, as shown in Table 54. Where card readers are available to faculty and/or students, 75 percent of the computing directors reported that their institutions have only one card reader. One computing center director reports that his or her institution has five card readers. The largest differences occurred in the number of teletypes reported to be available. Almost 60 percent of institutions which have teletypes have no more than five units. Another 23 percent computer center directors reported that their institutions have between six and ten teletypes. One director indicated that his or her institution makes between 36 and 40 teletypes available to faculty and students, and one director reported between 51 and 55 teletypes.

With few exceptions, the number of units of each kind of input/output device available at each institution is small. Ninety-four percent of computing center directors reported that their institutions have only one or two card readers,

Input/Output Device Available for Academic Computing	Number and (percent*) of Computer Center Directors Reporting Availability of Device	
Card Reader	36	(80)
Punched Paper Tape Reader or Punch	16	(36)
Teletype or Printing Terminal	34	(76)
Optical Character Scanner (On-Line)	9	(21)
Line Printer	38	(86)
On-Line Card Punch	21	(48)
Magnetic Tape Drive	24	(53)
Simple Video-Display Terminal	34	(76)
Graphic Video-Display Terminal	12	(27)
On-Line Plotter	12	(27)
Disc Storage Unit	1	(2)
Radio Shack Unit	1	(2)

Table 53. Number and (percent) of 55 directors of academic computing centers in minority higher education centers reporting the availability of various input/output devices for academic computing. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide access to computers.

Number of Academic Computing Center Directors Reporting Various Numbers of Input/Output Devices Available for Academic Computing													
	Type of Device												
Number of Devices Available	Card Reader	Punched Paper Tape Punch or Reader	Paper Tape Counted as Teletype	Teletype	Optical Character Scanner	Line Printer	Card Punch	Magnetic Tape Drive Unit	Simple CRT Terminal	Graphic CRT Terminal	Plotter	Disc Storage Unit	Radio Shack Unit
0			2										
1	27	9	4	4	9	25	18	11	8	6	12	1	
2	4		2	6		8	1	6	6	3			1
3	1	1	1	3		1		3		1			
4		1	1	5				2	4	2			
5	1	1	1	2				1	2				
6-10		2	2	8		1		1	4				
11-15				2					2				
16-20				2					3				
21-30									2				
31-40				1					1				
50-55				1					1				

Table 54. Distribution of number of input/output devices currently available for academic computing, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

64 percent reported only one or two punched paper tape units, 94 percent reported only one or two line printers, 70 percent reported only one or two magnetic tape drive units, and 75 percent reported only one or two graphic video display terminals. All computing center directors who reported that their institutions have optical character scanners, card punches, plotters, disc storage units and Radio Shack units listed only one or two of each such device. Teletypes and simple video display terminals are the only devices available at minority institutions in large numbers. All the other input/output devices were reported to be available in quantities not exceeding ten at responding minority institutions. Six computing center directors (11%) reported more than ten teletypes, with 55 the largest number reported, and nine (16%) reported more than ten simple CRTs, with 50 the largest number reported at one institution.

Some institutions provide input/output devices mainly for student use. This information is presented in Tables 55 and 56. Academic computing center directors reported that simple video display terminals are provided for students at 62 percent of the institutions that have computing equipment. About one-third of the institutions that reserve some simple CRT terminals for students provide one or two units. Three computing center directors reported between 15 and 18 simple video-display terminals available for student use, and three reported between 20 and 24. Graphic video-display terminals are less readily available, with 22 percent of computing center directors whose institutions have computing equipment indicating that their institutions make graphic CRTs available mainly for students. Three computing center directors reported that their institutions have more than one graphic CRT terminal mainly for student use. Only one computing center director reported as many as four graphic CRT terminals available mainly for student use. Teletypes or

Type of Input/Output Device Available Mainly for Student Use	Number and (percent)* of Directors of Academic Computing Centers Reporting Devices Available Mainly for Student Use	
Simple Video Display Terminal	28	(62)
Graphic Video Display Terminal	11	(26)
Teletype or Printing Terminal	33	(75)
Personal or Micro Computer	17	(39)

Table 55. Number and (percent) of 55 directors of academic computing centers in minority higher education institutions reporting various types of input/output devices available mainly for student use. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide access to computers.

Number of Computing Center Directors Reporting Numbers of Various Input/Output Devices Available Mainly for Student Use

	Type of Device			
Number of Units Available	Simple CRT	Graphic CRT	Teletype	Personal or Micro Computer
1	6	7	7	4
2	3	1	7	6
3	2	1	2	3
4	1	1	2	1
5	2		3	1
6	2		1	1
7				1
8			4	
10	2		3	
12	1		1	
14			1	
15	2			
16	1			
18	1			
20	2			
24	1			
55			1	

Table 56. Distribution of various input/output devices available mainly for student use, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

printing terminals are most commonly available for student use, with 76 percent of computing center directors reporting that their institutions provide them. The number of teletypes varies widely. Forty-two percent of computing center directors reporting that their institutions provide teletypes for student use reported the availability of one or two units. More than half the responding computing center directors (55 percent) indicated that their institutions have no more than four teletypes for student use. Eighty-eight percent reported that their institutions have ten or fewer teletypes for student use. One computing center director reported that his or her institution has 55 teletypes for students to use, the largest number available by far, with the next highest number being 14.

Personal or micro computers are available to students at about 39 percent of institutions with access to computers. The number of personal or micro computers available for student use is small; at 58 percent of institutions that provide them only one or two are reported to be set aside for students. One computing center director reported seven personal or micro computers available to students at his or her institutions, the largest number listed.

Input/output devices were reported to be located on campus at 91 percent of the institutions which have access to a computer for academic purposes. At about one-third of these 45 campuses, there is only one location where faculty or students can get information into or out of a computer. The remaining two-thirds of computing center directors report their faculty and students can go to two or more places on campus to use computer(s). This distribution is shown in Table 57. Though one computing center director reported as many as 15 locations on campus where input/output devices could be used, most respondents reported far fewer locations. Seventy-five percent reported one or two locations on campus where faculty or students have access to input/output devices.

Number of Campus Locations of Input/Output Devices	Number and (percent)* of Directors of Academic Computing Centers Reporting Various Numbers of Locations
1	15 (27)
2	10 (30)
3	7 (21)
4	2 (6)
5	1 (3)
6	2 (6)
9	1 (3)
15	1 (3)

Table 57. Distribution of number of campus locations of input/output devices, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide access to computers.

Twenty-one percent reported three locations.

Card processing devices were reported to be available to faculty or students for academic computing at the majority of responding institutions. A summary of this information is given in Tables 58 and 59. Keypunches were reported to be available by 86 percent of computing directors at institutions that have computers. The number of keypunches reported to be available varied from only one apiece at two institutions, to 25 at one other institution. Two-thirds of the computing center directors whose institutions have access to keypunches indicated they have access to no more than five. Most of the remaining computing center directors reported that their students and faculty have access to between six and 11 keypunches (approximately one-third of institutions that have access to any keypunches). Card sorters were reported to be accessible by not quite half (48%) of computing center directors. Those computing center directors who reported the number of card sorters available indicated that their institutions provide either one or two card sorters. Interpreters were available to faculty or students at 39 percent of institutions which provided access to a computer. The largest number of interpreters reported to be available was three at one institution. Two other computing center directors reported two apiece at their institutions, and the other twelve directors indicated that their institutions provided only one apiece. Off-line optical scanners were reported to be available at 14 percent of minority insitutions which have access to a computer. One optical scanner was available at each of the institutions reported to have any. One academic computing center director reported that his or her institution provided access to three reproducers, collators or accounting machines. No other computer center directors reported access to these devices.

Card Processing Devices for Academic Computing	Number (percent)* of Directors of Academic Computing Centers Reporting Devices Available	
Keypunch	38	(86)
Card Sorter	21	(48)
Interpreter	17	(39)
Optical Scanner	6	(14)
Reproducer, collator or Accounting Machine	1	(2)

Table 58. Number and (percent) or 55 directors of academic computing centers in minority higher education institutions, reporting various card processing devices available for academic computing. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide access to computers.

Number and (percent)* of Directors of Academic Computer Centers Reporting Numbers of Various Card Processing Devices Available for Academic Computing

Number of Devices	Type of Device				
	Keypunch	Card Sorter	Interpreter	Off-Line Optical Scanner	Reproducer, Collator or Accounting Machine
1	2 (4)*	16 (30)	12 (22)	6 (11)	
2	7 (13)	2 (4)	2 (4)		
3	5 (9)		1 (2)		1 (2)
5	7 (13)				
6	1 (2)				
7	3 (6)				
8	3 (6)				
9	1 (2)				
10	4 (7)				
11	1 (2)				
25	1 (2)				

Table 59. Distribution of numbers of various card processing devices available for academic computing, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide access to computers.

Directors of academic computing centers reported that card processing devices were located on-campus at 72 percent of the institutions which provided access to a computer. Card processing devices are presumed to be located off-campus at at least 16 percent of the remainder of the campuses, since they reported some access to such equipment.

B. Computing Software

Academic computing center directors were asked which computer languages are available to faculty and students for academic computing at their institutions. Their responses are summarized in Table 60. The language most frequently reported to be available is BASIC, with 92 percent of computing directors at institutions which have access to computers reporting that BASIC is available at their institutions. Between 60 and 80 percent of computing center directors at institutions that have computers reported that FORTRAN, COBOL, RPG and ASSEMBLER languages are available. Between 40 and 50 percent of minority higher education institutions that have computer access are reported to have PL/1 and APL available. Less than 20 percent of computing directors indicated that their institutions provide access to PASCAL and IDF, and less than 10 percent reported PILOT, SPL and COURSEWRITER. A number of other languages, not specified, were reported to be available at about 13 percent of the institutions that provide computer access.

Some packaged computer programs were reported to be available at slightly more than half the minority institutions included in this survey (See Table 61). About 52 percent of computing center directors at institutions that have computer access listed SPSS as being available for academic computing at their institutions. The BMD package was reported to be available at one-third of minority higher education institutions that have access to a computer. Conversational SPSS and SSP were listed by 25 percent of computing center directors.

Computer Language Available for Academic Computing	Number and Percent of Directors of Academic Computing Centers Reporting Availability of Computer Language	
BASIC	41	(92)*
PASCAL	7	(17)
FORTRAN	36	(80)
PL/1	20	(48)
COBOL	35	(80)
APL	19	(44)
RPG	28	(62)
PILOT	3	(7)
IDF	6	(14)
COURSEWRITER	4	(9)
ASSEMBLER	32	(73)
SPL	2	(4)
Others, not specified	7	(15)

Table 60. Number and (percent) of 55 directors of academic computing centers in minority higher education institutions reporting various computer languages available at their institutions. Data collected April, 1979.

* Percent (rounded) of directors of computing centers at institutions that provide access to computers.

Packaged Program	Number and (percent)* of Directors of Academic Computer Centers Reporting Available.	
SPSS	23	(52)
CONVERSATIONAL SPSS	11	(26)
SAS	9	(21)
BMD	14	(33)
SSP	11	(26)
OSIRIS	7	(17)
STP	1	(2.3)
COSAP or M SIC STAT	4	(7)
Locally made packages	4	(7)
Many Commercial packages	1	(2)

Table 61. Number and (percent) of 55 directors of academic computing centers in minority higher education institutions reporting various packages computer programs available at their institutions. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide access to computers.

About one-fifth of institutions which have access to computers were reported to provide SAS and OSIRIS packages. Less than ten percent of computing directors listed COSAP or MUSIC STAT and locally made packages. One director noted simply that many packages are available.

C. Computing Personnel

Fifty-eight percent of responding directors of academic computing centers reported that their institutions have an academic computing center or staff. This information is presented in Tables 62 and 63. The remaining 42 percent of minority higher education institutions that have access to a computer either employ computing personnel located elsewhere on campus, or consult personnel not employed by their institution. Only 27 percent of the directors of academic computing centers reported that they are employed at an academic computing center, the remainder presumably being faculty assigned to academic departments or administrative personnel. According to computing center directors, only five institutions in this survey have full-time directors of academic computer centers. Five others reported that they work half time. The rest of the computing center directors who reported that they are employed at a computer center located on campus, indicated that they work less than half time at that job.

Professional programmers were reported to be employed at about 22 percent of computing centers at responding institutions. Seven computing center directors (16% of those whose institutions have access to computers) indicated that programmers are employed 40 or more hours per week at their institutions. One center director reported that his or her institution employs two full-time programmers, or their equivalent. Four institutions were reported to have a programmer at work between 35 and 45 hours per week. Three other institutions that have computing centers were reported to employ only part-time programmers.

Professional keypunch operators were reported to be employed at computer centers at approximately one-fourth of minority institutions that have access to computers. Seven institutions were reported to employ keypunch operators 40 or more hours per week. One of those institutions was reported to have three fulltime keypunch operators, or part-time keypunch operators working enough hours to equal three worker-weeks. Two computing center directors reported that their computing centers employ two full-time keypunch operators each (or the equivalent in part-time professional help). Professional keypunch operators were reported to work half-time or less at the remaining institutions which have computing centers.

Professional computer operators were reported to be employed at about 29 percent of the institutions which have access to computers. One center director reported that his or her center employs either three full-time professional computer operators, or their equivalent in hours worked per week. Two other computing center directors reported two full-time computer operators, or their equivalent in part-time professional help. Approximately one-half of the computer center directors who indicated that computer operators are employed at their computing centers reported that their centers have one full-time professional operator, or the equivalent. Professional computer operators were reported to be employed part-time at the other institutions which have such employees.

Two computer center directors reported that their centers employ full-time systems analysts, or part-time systems analysts for a total of about 40 hours per week. One institution employs one systems analyst a quarter-time.

User services staff personnel were reported to be professional workers at 20 percent of institutions which have access to computers. About half of those institutions were reported to have professional user services staff on hand

Number and (percent)* of Directors of Academic Computing Centers Reporting that their Institutions Employ Professional Personnel, Faculty and Students in Various Capacities at the Academic Computing Center

Position	Status of Personnel Filling Position		
	Professional Computing Center Staff	Faculty	Students
Regular computing center staff	26 (58)		
Programmers	10 (18)	8 (15)	9 (16)
Keypunch Operators	11 (20)	1 (2)	7 (13)
Computer Operators	13 (24)	(data missing)	18 (33)
Systems Analyst	3 (6)	5 (10)	2 (4)
User Services Staff	9 (16)	4 (7)	9 (16)
Academic Computing Director	15 (27)	1 (2)	
Terminal Operators	1 (2)		
Other		1 (2)	2 (4)

Table 62. Number and (percent) of directors of academic computing centers in minority higher education institutions reporting various personnel employed at their academic computing center. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide access to computers.

Number of Directors of Academic Computing Centers Reporting the Total Hours per Week Worked at a Computing Center by Various Types of Professional Personnel at their Institutions							
Total Hours Per Week Worked by each Type of Professional	Type of Professional Personnel Employed at the Computing Center						
	Programmers	Keypunch Operators	Computer Operators	Systems Analysts	User Services Staff	Academic Computing Director	Terminal Operator
5 or less		1				2	
6-10	1	2	1	1	3	2	1
11-15	1					1	
20		1	2		2	5	
25							
30	1		1		1		
35							
36-40	3	4	5	1	3	2	
41-45	1		1	1		1	
50			1				
56-60						2	
70							
80	1	2	1				
81-85			1				
90							
100	1						
110-120	1	1	1				

Table 63. Distribution of number of hours per week worked by various professional personnel at academic computing centers, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

30 to 40 hours per week. The other half were reported to employ such personnel half-time or less.

One part-time terminal operator was reported to be employed at one of the academic computing centers in our sample.

Students and/or faculty were reported to be employed at computing centers in some capacity at about 40 percent of the institutions which have access to computers. (See Tables 64 and 65.)

Approximately the same number (9 and 8, respectively) of computing directors reported that students and faculty are employed at a computing center as programmers. The reported number of hours per week worked by students is considerably larger than the number of hours per week worked by faculty. All faculty at all institutions worked a total of 87 hours per week altogether. A total of about 300 hours per week was reported to be worked by all student programmers at all institutions that responded. One computing center director reported his or her center employs students as programmers approximately 100 hours per week. Another reported a total of 70 hours per week worked by students as programmers at the computing center. No computing center was reported to employ faculty members as programmers more than 30 hours per week, and most of them were reported to use faculty programmers 5 hours a week or less. No student programmers were reported to work less than 6 hours a week.

Students were reported to be employed as keypunch operators at about 15 percent of the institutions that have access to computers. One computing center director reported his or her center uses student keypunch operators 100 hours per week. Three directors reported employing students as keypunch operators between 30 and 45 hours per week. No other institution was reported to employ students as keypunch operators at their computing center more than 20 hours per week. One faculty member was reported to work as a keypunch

Number of Directors of Academic Computing Centers Reporting the Employment of Students in Various Capacities at the Academic Computing Center, and the Total Hours per week Worked by all Students at their Institution in each Employment Category

Total Hours per Week	Capacity in which Students are Employed					
	Programmers	Keypunch Operators	Computer Operators	Systems Analysts	User Services Staff	Other
5 or less			1	1		
6-10	3		3	1	1	
11-15		1	1			
16-20	2	2	1		1	
21-25			2			
26-30	1	1	1		1	
31-35			1			
36-40	1	1				
45		1	1		1	
50			2		2	
60			2		2	
70	1					
80						
100	1	1				
120						1

Table 64. Distribution of number of hours per week worked by students in various capacities at academic computing centers, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

Number of Directors of Academic Computing Centers Reporting the Employment of Faculty in Various Capacities at the Academic Computing Center, and the Total Hours per Week Worked by all Faculty in each Employment Category

Total Hours per Week	Capacity in which Faculty are Employed					
	Center Director	Programmer	Keypunch Operator	Computer Operator	Systems Analyst	User Services Staff
5 or less		4	1	(data missing)	3	1
6-10						
15	1				1	
20		2				
30		1				1
40						

Table 65. Distribution of number of hours per week worked by faculty in various capacities at academic computing centers, reported by 55 directors of academic computing centers at minority higher education institutions. Data collected April, 1979.

operator at one institution for three hours per week.

Students were reported to work as computer operators at 40 percent of institutions that have access to computers. (The percentage of on-campus computing centers that employ students as computer operators is 70 percent in our sample.) Approximately half of academic centers were reported to employ students as computer operators 30 hours a week or less. Two center directors indicated that students are employed as computer operators a total of 60 hours per week at their centers. Two additional directors indicated that their centers employ students as computer operators a total of 50 hours a week each. The data on faculty employed as computer operators are missing.

Computing center directors reported that faculty are employed as systems analysts at 11 percent of institutions that have access to computers, and students are systems analysts at about four percent of such institutions. Neither faculty nor student systems analysts were reported to work more than 15 hours a week at any responding institution. Twenty percent of institutions with access to a computer employ students as user services staff. Five computing center directors noted that students are employed at their computer centers as user services staff more than 40 hours per week. The other three reported that students are employed in that capacity 30 hours a week or less. Five center directors reported employing faculty as user services staff at the computer center.

One computing center director reported that students work at the computer center at his or her institution a total of 120 hours a week doing miscellaneous computer center chores. One faculty member was reported to work part-time as computing center director.

Professional computer personnel were reported to be employed on campus but outside the central computing center at no more than ten percent of institutions with access to a computer. (See Tables 66 and 67.) Two computing directors reported that programmers work outside the main computer center at their institutions. One reported 40 hours per week of outside programmer time, the other reported 5 hours a week or less. One computing center director reported that keypunch operators are employed outside the central computing facility at his or her institution, working a total of 40 hours per week. Computer operators were reported to be employed outside the central computer facility by four center directors. One of those directors reported outside computing operators to be working the equivalent of four full-time worker-weeks. One other reported two full-time worker-week equivalent computer operators employed outside the main computer facility. One computing director reported one full-time equivalent employee working as a computer operator outside the main facility. The other computing center director reported that outside computer operators work a total of 5 hours a week or less at his or her institution. Two computing center directors reported the use of outside systems analysts. The time was given for only one of those institutions, 10 hours a week or less. Two computing center directors reported the use of outside user services staff, each of them noting the equivalent of one full-time worker per week. Other professional computer personnel were reported by one computing center director at one institution, the equivalent of one full-time person per week.

D. Dollar Investment in Academic Computing

Expenditures for hardware for academic computing did not account for large portions of the 1977-78 budgets of most of the minority institutions whose computing center directors responded to this survey. (See Table 68.) Of those institutions which spent funds on hardware for academic computing during 1977-78, 44 percent were reported to have spent under $10,000, not a large amount given the cost of computing equipment. An additional 40 percent

Professional Personnel Employed Outside the Academic Computing Center	Number and (percent)* of Directors of Academic Computing Centers Reporting the Employment of Professional Personnel Outside the Academic Computing Center	
Programmer	2	(4)
Keypunch Operator	1	(2)
Computer Operator	4	(7)
Systems Analyst	2	(4)
User Services Staff	4	(11)
Other Professional Personnel	1	(3)

Table 66. Number and (percent) of 55 directors of academic computing centers in minority higher education institutions reporting various professional personnel employed outside the main academic computing center at their institutions. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers that provide access to computers.

Number of Directors of Academic Computing Centers Reporting Employment of Professional Personnel in Various Capacities Outside the Academic Computing Center and the Total Hours per Week Worked by All Professional Personnel in each Category

Hours per Week	Type of Professional Personnel Employed Outside Academic Computing Center					
	Programmers	Keypunch Operators	Computer Operators	Systems Analysts	User Services Staff	Other Staff
5 or less	1		1			
10				1		
20						
25						
30						
35					1	
40	1	1	1		1	1
60						
80			1			
168			1			

Table 67. Distribution of number of hours per week worked by various professional computer personnel outside the main computing center, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

of minority institutions were reported to have spent between $10,001 and $50,000. No computing director reported his or her institution spent over a quarter of a million dollars for computing hardware during that fiscal year. A few, approximately 9 percent, of computing directors indicated that their institutions spent between $50,000 and $100,000 for hardware during the fiscal year, and about 7 percent of computing center directors noted that their institutions spent between $100,000 and $250,000. According to these figures, 88 percent of minority institutions spent less than $50,000 during fiscal year 1977-78, and about 14 percent of minority institutions spent over $50,000, but still less than $240,000 during that fiscal year. As in other computer-generated tables in this study, "code 999" refers to missing data.

Expenditures for software for academic computing were also low during fiscal year 1977-78, as summarized in Table 69. About 63 percent of institutions with access to computers were reported to have spent $1,000 or less for software. About 26 percent of institutions with computer access spent between $1,000 and $5,000. Approximately 12 percent of computing center directors at minority institutions reported that their institutions spent over $5,000 but less than $10,000.

Telecommunications expenditures also tended toward the low end of the scale at institutions in this sample, as shown in Table 70. About 68 percent of responding computing directors indicated that their institutions spent less than $2,500 for telecommunications during fiscal year 1977-78. Twenty percent spent $2,500 to $5,000. Fewer institutions spent amounts larger than $5,000. Three computing center directors noted that their institutions spent between $5,000 and $10,000, and two directors indicated spending between $10,000 and $25,000 for telecommunications that year.

Maintenance costs were not uniformly low at minority institutions in this sample during fiscal year 1977-78. (See Table 71.) About 38 percent of computing directors noted that their institutions spent under $1,000. About 21 percent reported between $10,000 and $25,000 for maintenance. Seven percent indicated that their institutions spent over $25,000. The remaining fourth of responding computing directors noted between $2,500 and $10,000 for maintenance.

Personnel costs reflected the small numbers of professional personnel employed, and the relatively small number of computing centers located on campus, as shown in Table 72. About 61 percent of computing center directors indicated that their institutions spent under $10,000 for personnel costs during fiscal year 1977-78. About 14 percent noted between $10,000 and $25,000, and an equal number between $25,000 and $50,000. About 9 percent reported their institutions spending between $75,000 and $100,000. One computing director indicated over $100,000 for personnel costs for academic computing during fiscal year 1977-78.

One computing center director reported that his or her institution spent funds for computing time for academic computing, one reported expenditure of funds for off-site computing time, and one reported expenditure of funds for time sharing. The amounts were not reported.

Academic computing directors were asked to report how much their institutions had spent for all computing costs, both academic and administrative, during the five fiscal years, beginning in 1973 and ending in 1978. Hardware costs for academic and administrative computing for five years were reported to be under one million dollars at all of the institutions, with the median expenditure in the $100,00 to $250,000 range. This distribution is presented in Table 73. Academic computing costs were reported to account for amounts

```
ASHARU    EXPENDITURE FOR ACAD COMP HARDWARE 77-78

                                                 RELATIVE   ADJUSTED     CUM
                                      ABSOLUTE     FREQ       FREQ      FREQ
CATEGORY LABEL                  CODE    FREQ      (PCT)      (PCT)     (PCT)

0 -     10,000                    1.      20       36.4       44.4      44.4

10,001- 50,000                    2.      18       32.7       40.0      84.4

50,000-100,000                    3.       4        7.3        8.9      93.3

100,001-250,000                   4.       3        5.5        6.7     100.0

                                999.      10       18.2    MISSING     100.0
                                       ------     ------     ------
                               TOTAL      55      100.0      100.0
```

Table 68. Distribution of expenditures for academic computer hardware during the academic year 1977-78, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

ASSUFT EXPENDITURE FOR ACAD COMP SOFTWARE 77-78

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
0 - 1,000	1.	27	49.1	62.8	62.8
1,001 - 5,000	2.	11	20.0	25.6	88.4
5,001 - 10,000	3.	5	9.1	11.6	100.0
	999.	12	21.8	MISSING	100.0
	TOTAL	55	100.0	100.0	

Table 69. Distribution of expenditures for academic computer software during academic year 1977-78, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

```
ASTELE    AMT SPENT ON TELECOMMUNICATIONS 1977-78

                                                   RELATIVE  ADJUSTED    CUM
                                        ABSOLUTE     FREQ      FREQ      FREQ
CATEGORY LABEL                   CODE     FREQ      (PCT)     (PCT)     (PCT)

0 -      2,500                     1.       28       50.9      68.3      68.3

2,501 - 5,000                      2.        8       14.5      19.5      87.8

5,001 - 10,000                     3.        3        5.5       7.3      95.1

10,001 - 25,000                    4.        2        3.6       4.9     100.0

                                 999.       14       25.5   MISSING     100.0
                                          ------    ------    ------
                                 TOTAL      55      100.0     100.0
```

Table 70. Distribution of expenditures for telecommunications for academic computing during academic year 1977-78, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

```
08/30/79          FILE - COMPCENT - CREATED 08/30/79              PAGE 101

ASMAIN    AMT SPENT FOR MAINTENANCE 1977-78

                                                  RELATIVE   ADJUSTED     CUM
                                      ABSOLUTE      FREQ       FREQ       FREQ
CATEGORY LABEL              CODE        FREQ       (PCT)      (PCT)      (PCT)

0 -      1,000                1.          16        29.1       38.1       38.1

1,001 - 2,500                 2.           3         5.5        7.1       45.2

2,501 - 5,000                 3.           4         7.3        9.5       54.8

5,001 - 10,000                4.           7        12.7       16.7       71.4

10,001 - 25,000               5.           9        16.4       21.4       92.9

> 25,000                      6.           3         5.5        7.1      100.0

                            999.          13        23.6    MISSING      100.0
                                      ------      ------     ------
                           TOTAL          55       100.0      100.0
```

Table 71. Distribution of expenditures for maintenance of academic computing during academic year 1977-78, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

```
ASPERS     AMOUNT SPENT FOR PERSONNEL 77-78

                                                     RELATIVE   ADJUSTED    CUM
                                          ABSOLUTE     FREQ       FREQ      FREQ
CATEGORY LABEL                    CODE      FREQ       (PCT)      (PCT)     (PCT)

0 -      10,000                     1.        27        49.1       61.4      61.4

10,001 - 25,000                     2.         6        10.9       13.6      75.0

25,001 - 50,000                     3.         6        10.9       13.6      88.6

75,001 - 100,000                    5.         4         7.3        9.1      97.7

      > 100,000                     6.         1         1.8        2.3     100.0

                                  999.        11        20.0     MISSING    100.0
                                           -------    -------    -------
                                 TOTAL        55       100.0      100.0
```

Table 72. Distribution of expenditures for personnel for academic computing during academic year 1977-78, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

ranging from three percent to one hundred percent of all computing hardware costs, with both mean and median amounts at forty percent. (See Table 74.)

Total software costs for the five fiscal years for both academic and administrative computing were reported to vary from under $1,000 to over $50,000, with the median in the $5,000 to $10,000 range. Only one computing center director reported the expenditure of over $50,000 for software for the period, and five reported expenditures under $1,000. The proportion of software expenditures devoted to academic computing ranged from none to all, with a mean of 33 percent and a median of 13 percent. Frequency distributions of software expenditures and percent of software costs for academic computing are presented in Tables 75 and 76. Two directors of academic computing centers indicated that no money was spent at their institutions for packaged programs or languages for academic computing. One noted that the only expenditure of funds for software at his or her institution was for academic use. Administrative costs for computing software clearly were much larger than academic costs at most of the reporting institutions.

Total costs of space and facilities for five years were reported to be less than $1,000 at eight institutions, and between $100,000 and $500,000 at one institution. The average reported expenditure for space and facilities was in the $1,000 to $5,000 range. Tables 77 and 78 contain frequency distributions for space and facilities costs and the portion of those costs devoted to academic computing. One computing center director reported that no funds were spent for academic computing space and facilities at his or her institution, and one computing center director reported that all funds spent for space and facilities were academic computing costs at his or her institution. In general, administrative computing costs for space and facilities exceeded academic computing costs. Of computing directors reporting, most

```
TSHARU     TOTAL COST HARDWARE ACAD & ADMIN 1973-78

                                                  RELATIVE   ADJUSTED     CUM
                                       ABSOLUTE     FREQ       FREQ       FREQ
CATEGORY LABEL                 CODE      FREQ      (PCT)      (PCT)      (PCT)

0 -      10,000                  1.         2        3.6        4.4        4.4

10,001 - 50,000                  2.         4        7.3        8.9       13.3

50,001 -100,001                  3.         4        7.3        8.9       22.2

100,001-250,000                  4.        11       20.0       24.4       46.7

250,001-500,000                  5.         6       10.9       13.3       60.0

500,001-1000,000                 6.         7       12.7       15.6       75.6

DON'T   KNOW                     8.        11       20.0       24.4      100.0

                               999.        10       18.2    MISSING      100.0
                                       ------     ------     ------
                              TOTAL        55      100.0      100.0
```

Table 73. Distribution of total expenditures for hardware for academic and administrative computing for academic years 1973-74 through 1977-78, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

PSHARD PERC HARDWARE TOTAL FOR ACAD COMP 73-78

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	3.	1	1.8	3.7	3.7
	4.	1	1.8	3.7	7.4
	5.	1	1.8	3.7	11.1
	10.	3	5.5	11.1	22.2
	15.	2	3.6	7.4	29.6
	20.	2	3.6	7.4	37.0
	24.	1	1.8	3.7	40.7
	30.	1	1.8	3.7	44.4
	36.	1	1.8	3.7	48.1
	40.	3	5.5	11.1	59.3
	50.	3	5.5	11.1	70.4
	60.	4	7.3	14.8	85.2
	70.	1	1.8	3.7	88.9
	90.	1	1.8	3.7	92.6
	100.	2	3.6	7.4	100.0
	999.	28	50.9	MISSING	100.0
	TOTAL	55	100.0	100.0	

Table 74. Distribution of percentages of total five-year expenditures for hardware accounted for by academic computing, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

```
TSSUFT     TOTAL COST SOFTWARE ACAD & ADMIN 73-78

                                                      RELATIVE   ADJUSTED     CUM
                                           ABSOLUTE     FREQ       FREQ       FREQ
CATEGORY LABEL                     CODE      FREQ      (PCT)      (PCT)      (PCT)

0 -      1,000                       1.         5        9.1       11.1       11.1

1,001 -  5,000                       2.         8       14.5       17.8       28.9

5,001 - 10,000                       3.         7       12.7       15.6       44.4

10,001 - 25,000                      4.         4        7.3        8.9       53.3

25,001 - 50,000                      5.         6       10.9       13.3       66.7

>50,000                              6.         1        1.8        2.2       68.9

DON'T KNOW                           7.        14       25.5       31.1      100.0

                                   999.        10       18.2    MISSING      100.0
                                           ------     ------     ------
                                  TOTAL        55      100.0      100.0
```

Table 75. Distribution of total expenditures for software for academic and administrative computing for academic years 1973-74 through 1977-78, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

```
PSSUFT     PERC SOFTWARE TOTAL FOR ACAD COMP 73-78

                                            RELATIVE  ADJUSTED     CUM
                                 ABSOLUTE     FREQ      FREQ      FREQ
CATEGORY LABEL            CODE     FREQ      (PCT)     (PCT)     (PCT)

                            0.        2        3.6       9.1       9.1

                            2.        3        5.5      13.6      22.7

                            5.        1        1.8       4.5      27.3

                           10.        4        7.3      18.2      45.5

                           12.        1        1.8       4.5      50.0

                           30.        1        1.8       4.5      54.5

                           40.        2        3.6       9.1      63.6

                           50.        2        3.6       9.1      72.7

                           56.        1        1.8       4.5      77.3

                           60.        1        1.8       4.5      81.8

                           70.        1        1.8       4.5      86.4

                           80.        1        1.8       4.5      90.9

                           90.        1        1.8       4.5      95.5

                          100.        1        1.8       4.5     100.0

                          999.       33       60.0   MISSING     100.0
                                  ------    ------    ------
                         TOTAL       55      100.0     100.0
```

Table 76. Distribution of percentages of total five-year expenditures for software accounted for by academic computing, as reported by directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

indicated that academic computing costs amounted to half or less than half of all funds spent for space and facilities, with the median around 19 percent and the mean around 26 percent.

One computing center director indicated that some funds were spent at his or her institution for maintenance, and that about 20 percent of those funds were allocated to academic computing costs, but did not report the amount.

Directors of academic computing centers reported that funds for academic computing came from the institution, and from federal agencies, state agencies, and other sources. The number and percent of academic computing directors who indicated that their institutions received support from these sources are summarized in Table 79. Institutional funds,for academic computing were reported to be available at 55 percent of institutions that have computer access. A distribution of the amounts of institutional funds available for academic computing is shown in Table 80. Amounts obtained from their own institutions for academic computing were reported by computing center directors to range from $3,000 to $210,000, with the mean around $57,000 and the median about $35,500.

The amount of federal funds reported to have been received for academic computing ranged from none to about $330,000. About one-half of computing center directors at institutions with computer access reported that their institutions received federal funds for academic computing, in varying amounts, with the reported mean about $42,000 and the reported median about $10,000 (at all institutions in the survey, 42%). This distribution is summarized in Table 81.

Approximately one-third of academic computing directors reported receiving state funds for academic computing. Too few directors reported the amount of state funds given them to draw any conclusions about the generosity of the

TSSP COST SPACE & FAC ACAD & ADMI COMP 73-78

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
0 - 1,000	1.	8	14.5	17.8	17.8
1,001 - 5,000	2.	3	5.5	6.7	24.4
5,001 - 10,000	3.	1	1.8	2.2	26.7
10,001 -50,001	4.	5	9.1	11.1	37.8
50,001 -100,000	5.	3	5.5	6.7	44.4
100,001-500,000	6.	1	1.8	2.2	46.7
DON'T KNOW	8.	24	43.6	53.3	100.0
	999.	10	18.2	MISSING	100.0
	TOTAL	55	100.0	100.0	

Table 77. Distribution of total expenditures for space and facilities for academic and administrative computing during academic years 1973-74 through 1977-78, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

```
PSSF      PERC SPACE & FAC FOR ACAD COMP

                                                  RELATIVE   ADJUSTED     CUM
                                       ABSOLUTE     FREQ       FREQ       FREQ
CATEGORY LABEL                 CODE      FREQ      (PCT)      (PCT)      (PCT)

                                 0.         1        1.8        7.7        7.7

                                 5.         3        5.5       23.1       30.8

                                10.         2        3.6       15.4       46.2

                                20.         2        3.6       15.4       61.5

                                30.         1        1.8        7.7       69.2

                                40.         2        3.6       15.4       84.6

                                50.         1        1.8        7.7       92.3

                               100.         1        1.8        7.7      100.0

                               999.        42       76.4    MISSING      100.0
                                       ------     ------     ------
                              TOTAL        55      100.0      100.0
```

Table 78. Distribution of percentages of total five-year expenditures for space and facilities accounted for by academic computing, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

Source of Support for Academic Computing	Number and (Percent)* of Directors of Academic Computing Centers Reporting Receipt of Funds for Academic Computing from Various Sources	
Institutions	23	(42)
Federal	22	(40)
State	14	(26)
Other	3	(6)

Table 79. Number and (percent) of 55 directors of academic computer centers in minority higher education institutions reporting various sources of support for academic computing. Data collected April, 1979.

* Percent (rounded) of all directors of academic computing centers who participated in this survey.

AMTINS AMT INSTITUTION FUNDS FOR ACAD COMP

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	3000.	1	1.8	7.1	7.1
	5000.	1	1.8	7.1	14.3
	6000.	1	1.8	7.1	21.4
	10000.	1	1.8	7.1	28.6
	16000.	1	1.8	7.1	35.7
	25000.	1	1.8	7.1	42.9
	35000.	1	1.8	7.1	50.0
	50000.	1	1.8	7.1	57.1
	60000.	2	3.6	14.3	71.4
	61975.	1	1.8	7.1	78.6
	70000.	1	1.8	7.1	85.7
	180000.	1	1.8	7.1	92.9
	210000.	1	1.8	7.1	100.0
	999.	41	74.5	MISSING	100.0
	TOTAL	55	100.0	100.0	

Table 80. Distribution of amount of institutional funds provided for academic computing, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

sources. The reported information is presented in Table 82.

Four academic computing directors reported receiving funds from other sources, not named, for support of academic computing. The ones who listed the amounts received indicated $2,000 and $20,000.

In some cases, the figures given for academic computing costs are estimates made by directors of academic computing centers, not compilations. About two-thirds of deans or academic vice presidents who reponded to this survey reported that academic computing costs are not separated from other computing costs in their budgets.

E. Student and Faculty Computing Capabilities

Science department heads were asked to assess the computing skills of faculty in their departments, of students enrolled in their departments and of students just entering their departments.

When asked what percent of currently enrolled students had no computing skills, only five percent of science department heads reported that all of their students were completely lacking in computer skills. Frequencies for responses to this question are shown in Table 83. One-fourth of the responding science department heads indicated that all of their students had at least some computing skills. Responses of science department heads indicate that about two-thirds of the students enrolled in their departments have at least some computer skills.

Science department heads were asked what percent of students currently enrolled in their departments have a general awareness of computers, not necessarily direct use of computers, but knowledge about their uses. The frequency distribution for the responses to this question are given in Table 84. About a fifth of responding science department heads noted that none of their students had any general knowledge about computers. One science department

```
AMTFEDS    AMT FEDERAL FUNDS FOR ACAD COMPUTING

                                                 RELATIVE   ADJUSTED      CUM
                                       ABSOLUTE    FREQ       FREQ       FREQ
CATEGORY LABEL                 CODE      FREQ     (PCT)      (PCT)      (PCT)

                                 0.         2      3.6       12.5       12.5

                              2000.         1      1.8        6.3       18.8

                              2400.         1      1.8        6.3       25.0

                             10000.         5      9.1       31.3       56.3

                             20000.         2      3.6       12.5       68.8

                             34000.         1      1.8        6.3       75.0

                             42000.         1      1.8        6.3       81.3

                             50000.         1      1.8        6.3       87.5

                            130000.         1      1.8        6.3       93.8

                            329262.         1      1.8        6.3      100.0

                               999.        39     70.9    MISSING      100.0
                                       ------   ------     ------
                              TOTAL        55    100.0      100.0
```

Table 81. Distribution of amount of federal funds provided for academic computing, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

AMTSTAS AMT STATE FUNDS FOR ACADEMIC COMPUTING

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	15000.	1	1.8	25.0	25.0
	30000.	1	1.8	25.0	50.0
	50000.	1	1.8	25.0	75.0
	300000.	1	1.8	25.0	100.0
	999.	51	92.7	MISSING	100.0
	TOTAL	55	100.0	100.0	

Table 82. Distribution of amount of state funds provided for academic computing, as reported by 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

```
OLDSKL1   PERC CURRENT STUD NO COMPUTER SKILLS

                  ADJ CUM                       ADJ CUM                       ADJ CUM
   CODE     FREQ  PCT PCT      CODE      FREQ   PCT PCT      CODE      FREQ   PCT PCT

     0.       34   26  26       25.         5     4  51       70.         3     2  76
     1.        1    1  27       30.         4     3  54       75.         3     2  78
     2.        2    2  29       33.         1     1  55       77.         1     1  79
     3.        1    1  29       35.         2     2  57       80.         7     5  84
     5.        5    4  33       40.         9     7  64       85.         6     5  89
     6.        1    1  34       48.         1     1  64       88.         1     1  90
    10.        6    5  39       50.         8     6  71       90.         3     2  92
    15.        1    1  40       60.         3     2  73       95.         4     3  95
    20.       10    8  47       63.         1     1  74      100.         6     5 100

                              M I S S I N G   D A T A
   CODE     FREQ               CODE      FREQ                CODE      FREQ

   999.       49
```

Table 83. Distribution of percentages of currently enrolled students who have no computer skills, as reported by 178 heads of science departments in minority higher education institutions. Data collected April, 1979.

head reported that all of his or her students had at least general awareness. According to department heads, about 28 percent of all students enrolled in their science departments are generally aware of the uses of computers.

When asked how many of their students had limited use skills, defined as the ability to use others' programs but not to program themselves, science department heads' answers ranged from none of their students to all of their students. Their responses are shown in Table 85. Twenty percent of science department heads indicated that none of their students possess computing limited skills, three science department heads (2%) reported that all of their students do. About half of science department heads indicated that ten percent or less of their students possess limited computing skills.

Responses to the question of how many currently-enrolled science students can program a computer ranged from none to all. One fourth of science department heads reported that none of their students can program a computer. Five (4%) indicated that all of their students have programming skills. The frequency distribution of responses is given in Table 86. About half the science department heads reported that six percent less of their students can program.

New students were judged to be somewhat less knowledgable than currently-enrolled students. Only 13 percent of science department heads reported that none of their new students were totally lacking in computer skills, while 15 percent indicated that all their new students were totally lacking in computer skills. Table 87 provides a frequency distribution of science department heads' responses to the question of how many new students have no computer skills.

The percent of new students who are generally aware of computers was also estimated by science department heads. About one-fifth of department heads reported that none of their new students were at that skill level, and six

```
OLDSKL2   PERC CURRENT STUD GENL AWARE COMPUTERS

                    ADJ  CUM                     ADJ  CUM                     ADJ  CUM
   CODE      FREQ   PCT  PCT      CODE     FREQ  PCT  PCT      CODE     FREQ  PCT  PCT

     0.        24    19   19       20.       12    9   55       65.        1    1   88
     1.         1     1   19       25.        6    5   60       70.        1    1   89
     3.         3     2   22       30.        9    7   67       74.        1    1   90
     5.         8     6   28       33.        1    1   67       75.        3    2   92
     6.         1     1   29       35.        2    2   69       79.        2    2   94
     8.         2     2   30       37.        1    1   70       80.        3    2   96
    10.        14    11   41       40.        9    7   77       85.        1    1   97
    12.         1     1   42       43.        1    1   78       90.        1    1   98
    13.         1     1   43       45.        2    2   79       91.        1    1   98
    15.         3     2   45       50.        4    3   82       95.        1    1   99
    18.         1     1   46       60.        7    5   88      100.        1    1  100

                                M I S S I N G   D A T A
   CODE      FREQ                 CODE     FREQ                 CODE     FREQ

   999.        49
```

Table 84. Distribution of currently enrolled science students who have general awareness of computers and uses of computers in society, as reported by 178 heads of science departments in minority higher education institutions. Data collected April, 1979.

```
OLDSKL3   PERC CURRENT STUD LIMITED COMPUTER USE

                  ADJ  CUM                    ADJ  CUM                    ADJ  CUM
   CODE     FREQ  PCT  PCT     CODE     FREQ  PCT  PCT     CODE     FREQ  PCT  PCT

     0.       26   20   20      10.       17   13   57      35.        1    1   88
     1.        4    3   23      12.        2    2   58      40.        1    1   89
     2.        1    1   24      15.        4    3   61      45.        1    1   90
     3.        2    2   26      19.        1    1   62      50.        5    4   94
     4.        1    1   26      20.       18   14   76      60.        3    2   96
     5.       17   13   40      22.        1    1   77      70.        1    1   97
     7.        2    2   41      25.        7    5   82      95.        1    1   98
     8.        1    1   42      28.        1    1   83     100.        3    2  100
     9.        2    2   43      30.        6    5   88

                               M I S S I N G   D A T A
   CODE     FREQ               CODE     FREQ               CODE     FREQ

   999.       49
```

Table 85. Distribution of percentages of currently enrolled science students who have limited personal skills in using computers, as reported by 178 heads of science departments in minority higher education institutions. Data collected April, 1979.

```
OLDSKL4   PERC CURRENT STUD WHO CAN PROGRAM COMP

                    ADJ CUM                     ADJ CUM                      ADJ CUM
     CODE     FREQ  PCT PCT      CODE     FREQ  PCT PCT      CODE     FREQ   PCT PCT

       0.       34   26  26       10.       12    9  60       50.        8     6  90
       1.        3    2  29       15.        7    5  66       55.        1     1  91
       2.        4    3  32       20.        7    5  71       60.        2     2  92
       3.        4    3  35       25.        6    5  76       67.        1     1  93
       4.        1    1  36       30.        2    2  78       68.        1     1  94
       5.       18   14  50       33.        1    1  78       75.        1     1  95
       6.        1    1  50       34.        1    1  79       80.        2     2  96
       9.        1    1  51       40.        6    5  84      100.        5     4 100

                           M I S S I N G   D A T A
     CODE     FREQ               CODE     FREQ               CODE     FREQ

     999.       49
```

Table 86. Distribution of percentages of currently enrolled science students who are able to program computers, as reported by 178 heads of science departments in minority higher education institutions. Data collected April, 1979.

```
08/30/79          FILE - SCIENCED - CREATED 08/25/79           PAGE  121

NEWSKL1   PERC NEW STUD NO COMPUTER SKILLS

                  ADJ CUM                     ADJ CUM                     ADJ CUM
     CODE    FREQ PCT PCT       CODE     FREQ PCT PCT       CODE     FREQ PCT PCT

       0.      17  13  13        48.        1   1  39        86.        1   1  65
       2.       2   2  15        50.        8   6  46        90.       13  10  75
       5.       4   3  18        69.        1   1  46        93.        1   1  76
      10.       8   6  24        70.        4   3  50        95.        6   5  80
      20.       7   6  30        75.        4   3  53        96.        1   1  81
      25.       6   5  35        77.        1   1  54        97.        3   2  83
      30.       2   2  36        79.        1   1  54        98.        2   2  85
      35.       1   1  37        80.        7   6  60       100.       19  15 100
      40.       2   2  39        85.        5   4  64

                            M I S S I N G   D A T A
     CODE    FREQ               CODE     FREQ               CODE     FREQ

     999.      51
```

Table 87. Distribution of percentages of newly enrolled science students who have no computer skills, as reported by 178 heads of science departments in minority higher education institutions. Data collected April, 1979.

percent reported that all of theirs were. About half of science department heads reported that 15 percent or fewer of their students possessed only general awareness of computers. This frequency distribution is presented in Table 88.

Table 89 contains the frequency distribution of responses of science department heads when asked how many of their new students possessed limited computer skills. More than half reported that none of their new students possessed computer limited skills. No science department head reported more than 40 percent of his or her students at this level of computing skill. About half the department heads indicated that no more than one percent of their students would be able to use only prepared programs.

Percentages of new students able to program were also estimated by science department heads. Their responses are summarized in Table 90. More than half of science department heads reported that none of their incoming students could program. One department head reported that all of his or her new students are able to program.

Science department faculty skills were, of course, ranked higher than those of science students. Sixty-three percent of science department heads reported that their faculty members possessed at least some computer skills. Only one department head reported that none of his or her colleagues possessed computer skills. Three fourths of science department heads reported that only one-fifth or less of science faculty were completely lacking in skills. The frequency distribution for responses to this question is given in Table 91.

The percentage of science faculty who were reported to be proficient in computer programming exceeds the percentage who were rated as only "generally aware" or of "limited skill." Tables 92, 93, and 94 contain summaries of

```
NEWSKL2   PERC NEW STUD GENL AWARE OF COMPUTERS

                   ADJ  CUM                       ADJ  CUM                       ADJ  CUM
  CODE      FREQ   PCT  PCT     CODE       FREQ   PCT  PCT     CODE       FREQ   PCT  PCT

    0.        26    20   20      30.          3     2   59      75.          2     2   83
    1.         3     2   23      33.          1     1   60      80.          2     2   84
    2.         4     3   26      35.          1     1   61      84.          1     1   85
    3.         2     2   28      40.          7     6   66      85.          2     2   87
    4.         1     1   28      45.          1     1   67      87.          1     1   87
    5.         7     6   34      48.          1     1   68      88.          1     1   88
    8.         1     1   35      50.          7     6   73      90.          3     2   91
    9.         1     1   35      60.          4     3   76      95.          4     3   94
   10.        15    12   47      65.          1     1   77     100.          8     6  100
   15.         3     2   50      70.          4     3   80
   20.         9     7   57      74.          1     1   81

                               M I S S I N G   D A T A
  CODE      FREQ                CODE       FREQ                CODE       FREQ

  999.        51
```

Table 88. Distribution of percentages of newly enrolled science students who have general awareness of computers and uses of computers in society, as reported by 178 heads of science departments in minority higher education institutions. Data collected April, 1979.

```
08/30/79          FILE - SCIENCED - CREATED 08/25/79          PAGE  124

NEWSKL5   PERC NEW STUD LIMITED COMPUTER USE-SKILL

                                         RELATIVE   ADJUSTED      CUM
                              ABSOLUTE     FREQ       FREQ       FREQ
CATEGORY LABEL         CODE     FREQ      (PCT)      (PCT)      (PCT)

                         0.       53       29.8       41.7       41.7

                         1.       13        7.3       10.2       52.0

                         2.        3        1.7        2.4       54.3

                         3.        4        2.2        3.1       57.5

                         4.        3        1.7        2.4       59.8

                         5.       18       10.1       14.2       74.0

                         8.        2        1.1        1.6       75.6

                        10.       13        7.3       10.2       85.8

                        13.        1        0.6        0.8       86.6

                        15.        1        0.6        0.8       87.4

                        20.        5        2.8        3.9       91.3

                        22.        1        0.6        0.8       92.1

                        25.        3        1.7        2.4       94.5

                        27.        1        0.6        0.8       95.3

                        30.        2        1.1        1.6       96.9

                        40.        4        2.2        3.1      100.0

                       999.       51       28.7    MISSING      100.0
                               ------     ------     ------
                      TOTAL      178      100.0      100.0
```

Table 89. Distribution of percentages of newly enrolled science students who have limited personal skills in using computers, as reported by 178 heads of science departments in minority higher education institutions. Data collected April, 1979.

NEWSKL4 PERC NEW STUD WHO CAN PROGRAM COMPUTER

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	0.	74	41.6	58.3	58.3
	1.	13	7.3	10.2	68.5
	2.	10	5.6	7.9	76.4
	3.	1	0.6	0.8	77.2
	5.	10	5.6	7.9	85.0
	10.	10	5.6	7.9	92.9
	15.	1	0.6	0.8	93.7
	17.	1	0.6	0.8	94.5
	20.	3	1.7	2.4	96.9
	25.	1	0.6	0.8	97.6
	30.	1	0.6	0.8	98.4
	60.	1	0.6	0.8	99.2
	100.	1	0.6	0.8	100.0
	999.	51	28.7	MISSING	100.0
	TOTAL	178	100.0	100.0	

Table 90. Distribution of percentages of newly enrolled science students who are able to program computers, as reported by 178 heads of science departments in minority higher education institutions. Data collected April, 1979.

```
FACSKL1   PERCENT FACULTY NO COMPUTER SKILLS

                                                RELATIVE   ADJUSTED     CUM
                                     ABSOLUTE     FREQ       FREQ      FREQ
CATEGORY LABEL                CODE     FREQ      (PCT)      (PCT)     (PCT)

                                0.       82       46.1       62.6      62.6
                                2.        2        1.1        1.5      64.1
                                5.        4        2.2        3.1      67.2
                                9.        1        0.6        0.8      67.9
                               10.        6        3.4        4.6      72.5
                               20.        4        2.2        3.1      75.6
                               25.        5        2.8        3.8      79.4
                               28.        1        0.6        0.8      80.2
                               30.        3        1.7        2.3      82.4
                               35.        2        1.1        1.5      84.0
                               40.        3        1.7        2.3      86.3
                               50.        8        4.5        6.1      92.4
                               75.        1        0.6        0.8      93.1
                               80.        5        2.8        3.8      96.9
                               85.        2        1.1        1.5      98.5
                               90.        1        0.6        0.8      99.2
                              100.        1        0.6        0.8     100.0
                              999.       47       26.4    MISSING     100.0
                                     ------     ------     ------
                             TOTAL      178      100.0      100.0
```

Table 91. Distribution of percentages of faculty in science departments who have no computer skills, as reported by 178 heads of science departments in minority higher education institutions. Data collected April, 1979.

responses to requests for estimating percentages of faculty whose skills are at these three levels. About a fourth of responding science department heads reported that no faculty in their department could be described as generally aware of the uses of computers, while one science department head placed all of his or her faculty members in that category. About half of department heads noted that no more than twenty percent of science faculty could be rated as generally aware of the uses of computers. One-fifth of the science department heads reported that none of their faculty possessed limited computing skills. About half of department heads indicated that twenty percent or less of their faculty fit this category. Two percent reported that all of their faculty possessed at least minimum skill.

Fifteen percent of responding science department heads reported that none of the faculty members in their departments could program a computer; 11 percent reported that all could. About half of responding department heads reported that 25 percent or fewer faculty members were able to program.

F. Extent of Computer Use

Computing facilities were not reported to be available to faculty or students at about one-fourth of the institutions whose science department heads or directors of academic computing centers responded to this survey. Faculty and students at many of the institutions in this sample apparently do not attempt to fulfill their educational or training objectives by the use of computers. Computers are available at a maximum of 84 percent of the institutions in this sample.

Almost three-fourths of science department heads reported that faculty and/or students have access to computers at their institutions. Undergraduates are reported to have access to computers by about two-thirds of science

```
FACSKL2   PERC FACULTY GENL AWARE OF COMPUTERS

                 ADJ CUM                      ADJ CUM                      ADJ CUM
   CODE    FREQ  PCT PCT      CODE     FREQ   PCT PCT      CODE     FREQ   PCT PCT

     0.      35   27  27       34.        1     1  66       61.        1     1  88
     5.       4    3  30       35.        2     2  67       62.        1     1  89
    10.       6    5  34       38.        1     1  68       65.        2     2  90
    15.       4    3  37       40.        6     5  73       68.        1     1  91
    17.       1    1  38       45.        1     1  73       70.        4     3  94
    20.      13   10  48       50.        6     6  79       75.        2     2  95
    25.       9    7  55       51.        1     1  80       80.        3     2  98
    27.       2    2  56       54.        1     1  81       90.        1     1  98
    28.       1    1  57       55.        2     2  82       92.        1     1  99
    29.       1    1  58       58.        1     1  83      100.        1     1 100
    30.       9    7  65       60.        5     4  87

                           M I S S I N G   D A T A
   CODE    FREQ               CODE     FREQ                CODE     FREQ

   999.      47
```

Table 92. Distribution of percentages of faculty in science departments who have general awareness of computers and uses of computers in society, as reported by 178 heads of science departments in minority higher education institutions. Data collected April, 1979.

```
FACSKL3   PERC FACULTY LIMITED COMPUTER USE-SKILL

                   ADJ CUM                  ADJ CUM                  ADJ CUM
    CODE     FREQ PCT PCT    CODE     FREQ PCT PCT    CODE     FREQ PCT PCT

      0.       26  20  20     18.        1   1  46     40.        5   4  82
      4.        2   2  21     19.        1   1  47     45.        1   1  83
      5.        5   4  25     20.       18  14  60     50.        9   7  90
      7.        1   1  26     25.       13  10  70     57.        1   1  91
      8.        1   1  27     27.        1   1  71     60.        5   4  95
     10.       13  10  37     28.        2   2  73     67.        1   1  95
     12.        1   1  37     30.        4   3  76     70.        2   2  97
     13.        1   1  38     33.        2   2  77     75.        1   1  98
     15.        8   6  44     35.        1   1  78    100.        3   2 100
     17.        1   1  45     37.        1   1  79

                           M I S S I N G   D A T A
    CODE     FREQ                 CODE     FREQ                 CODE     FREQ

    999.       47
```

Table 93. Distribution of percentages of faculty in science departments who have limited personal skills in using computers, as reported by 178 heads of science departments in minority higher education institutions. Data collected April, 1979.

```
08/30/79          FILE - SCIENCED - CREATED 08/25/79          PAGE  130

FACSKL4   PERC FACULTY WHO CAN PROGRAM COMPUTER

                    ADJ CUM                   ADJ CUM                   ADJ CUM
   CODE      FREQ PCT PCT      CODE     FREQ PCT PCT      CODE     FREQ PCT PCT

     0.        19  15  15       20.        7   5  43       50.       10   8  76
     1.         3   2  17       22.        1   1  44       55.        1   1  77
     2.         1   1  18       23.        1   1  44       60.        5   4  81
     3.         1   1  18       25.       15  11  56       65.        1   1  82
     5.         7   5  24       30.        8   6  62       70.        3   2  84
    10.        10   8  31       33.        1   1  63       80.        3   2  86
    12.         1   1  32       35.        1   1  63       85.        1   1  87
    13.         1   1  33       37.        1   1  64       87.        1   1  88
    14.         1   1  34       40.        4   3  67       90.        1   1  89
    15.         3   2  36       42.        1   1  68       95.        1   1  89
    16.         2   2  37       45.        1   1  69      100.       14  11 100

                               M I S S I N G   D A T A
   CODE      FREQ              CODE     FREQ              CODE     FREQ

   999.        47
```

Table 94. Distribution of percentages of faculty in science departments who are able to program computers, as reported by 178 heads of science departments in minority higher education institutions. Data collected April, 1979.

department heads and just over three-fourths of directors of academic computing centers. Twenty-eight percent of science department heads and 22 percent of directors of academic computing indicated that graduate students have access to computers at their institutions, presumably because less than a third of the institutions in this sample have graduate schools. Seventy percent of science department heads reported that faculty have access to computers. Table 95 contains a summary of reports on computer access by science department heads and directors of academic computing centers.

Directors of academic computer centers were asked to estimate the number of jobs students and faculty ran on computers at their institutions, and the amount of computer time they used during fiscal year 1977-78.

About one-fourth of computer center directors at institutions that provide access to computers reported that no batch jobs were run by undergraduates during fiscal year 1977-78. Two computing center directors indicated that undergraduates ran more than 25,000 batch jobs. About half the reporting directors of academic computing centers reported that undergraduates ran 1,000 or more batch jobs during the year. Frequency distributions of estimates of student use of computers by directors of academic computer centers are shown in Tables 96 and 97.

Reported numbers of hours of interactive connect time does not quite agree with reported numbers of jobs run. Twenty-seven percent of computing directors estimated that no jobs were run by undergraduates, but nineteen percent estimated that no time was spent by undergraduates in computer interactive connect time. Between one-fifth and one-fourth of computing center directors reported that no undergraduates at their institutions used computers. Two computer center directors indicated that undergraduates at their institutions used computers a great deal, reporting over 25,000 hours of interactive

Question Asked	Responses by Science Department Heads		Responses by Directors of Academic Computing	
	Number (percent) Yes	Number (percent) No	Number (percent) Yes	Number (percent) No
Do Faculty and/or Students have access to computers?	131 (73.6)	47 (26.4)	44 (80)	11 (20)
Do Undergraduates have access to computers?	119 (66.9)	13 (7.3)	43 (78)	12 (22)
Do Graduate Students have access to computers?	50 (28.1)	17 (9.6)	22 (40)	8 (15)

Table 95. Number and (percent) of 55 directors of academic computing centers and 178 heads of science departments in minority higher education institutions reporting faculty or student access to computers. Data collected April, 1979.

Number and (percent)* of Directors of Academic Computing Centers Reporting Estimated Number of Batch Jobs Run By Undergraduate and Graduate Students at their Institutions		
Number of Batch Jobs	Student Category	
	Undergraduate	Graduate
0	11 (27)	17 (46)
1-100	2 (5)	5 (14)
101-500	2 (5)	3 (8)
501-1,000	2 (5)	4 (11)
1,001-5,000	8 (20)	3 (8)
5,001-10,000	5 (12)	2 (5)
10,001-25,000	5 (12)	none
> 25,000	2 (5)	none
Don't Know	4 (7)	3 (8)

Table 96. Distribution of number of batch jobs run by undergraduate students and graduate students during 1977-78, as reported by number and (percent) of 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide access to computers.

Number and (Percent)* of Directors of Academic Computing Centers Reporting Estimated Number of Interactive Connect Hours by Undergraduate and Graduate Students at their Institutions

Number of Interactive Connect Hours	Student Category	
	Undergraduates	Graduate
none	8 (18)	19 (43)
1-100	4 (9)	3 (6)
101-500	6 (14)	2 (4)
501-1,000	1 (2)	1 (2)
1,001-5,000	9 (21)	5 (11)
5,001-10,000	2 (4)	none
10,001-25,000	5 (11)	2 (4)
25,000	2 (4)	none
Don't Know	5 (11)	5 (11)

Table 97. Distribution of number of interactive connect hours by undergraduate and graduate students during 1977-78, as reported by number and (percent) of 55 directors of academic computing center directors in minority higher education institutions. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide access to computers.

connect time and over 25,000 batch jobs. About half the directors of academic computing estimated that their undergraduates used more than 1,000 hours of interactive connect time.

Roughly half the directors of academic computing reported that graduate students did not use computers at their institutions during 1977-78. Fifty-one percent of directors reported that graduate students used no interactive connect time at their institutions, and 46 percent reported that graduate students ran no jobs at their institutions. Where graduate students did not use computers, the average use appears to be around 1,000 hours and 1,000 jobs.

Directors of academic computing estimated that computer science students used computers at their institutions during 1977-78 somewhat more than did other science students, and a great deal more than did non-science students. All other students, including other science students, were estimated by more than half of computing directors to use ten percent or less of the total computer time used by students. Just over half the responding directors of academic computing centers estimated that computer science students accounted for more than half the student use of computers at their institutions. Four computer center directors reported that the only students who used their computers were in computer science. Eighteen percent reported that computer science students accounted for over 90 percent of computer use. Frequency distributions for percents of the three groups of students use of computers are given in Table 98.

Faculty computer use was also estimated by directors of academic computing centers. Twenty-eight percent of computing directors reported that faculty ran no jobs at their institutions, and twenty-one percent reported that faculty did not use any computer time. Where faculty did use computers, about half of computing directors indicated that the average number of faculty jobs was

Number and (Percent)* of Directors of Academic Computing Centers Reporting Estimates of the Percent of All Student Computer Use by Various Types of Students

Percent of Computer Time	Type of Student		
	Computer Science Students	Other Science Students	All Other Students
0	3 (8)	8 (21)	12 (31)
1-10	6 (16)	11 (29)	10 (25)
11-20	4 (11)	5 (13)	6 (15)
21-30	4 (11)	6 (16)	5 (13)
31-40	3 (8)	2 (5)	1 (2)
41-50	2 (5)	2 (5)	2 (5)
51-60	4 (11)	1 (2)	none
61-70	3 (8)	3 (8)	2 (5)
71-80	2 (5)	2 (5)	3 (8)
81-90	5 (13)	4 (10)	1 (2)
91-99	3 (8)	none	1 (2)
100	4 (10)	none	none

Table 98. Distribution of percent of student use of computers by three groups of students, as reported by number and (percent) or 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide access to computers.

Number and (Percent)* of Directors of Academic Computing Centers Reporting Estimated Number of Batch Jobs by Faculty at Their Institutions		
Number of Batch Jobs	Number and (Percent) of Directors of Academic Computing Centers Reporting Category of Faculty Use	
None	12	(28)
1-100	15	(35)
101-500	5	(12)
501-1,000	none	
1,001-5,000	6	(14)
5,001-10,000	none	
Don't Know	5	(12)

Table 99. Distribution of number of batch jobs by faculty during 1977-78, as reported by number and (percent) of 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide computer access.

Number and (Percent)* of Directors of Academic Computing Centers Reporting Estimated Number of Interactive Connect Hours by Faculty at their Institutions	
Number of Interactive Connect Hours	Number and (Percent) of Directors of Academic Computing Centers Reporting Category of Faculty Use
none	9 (12)
1-100	13 (30)
101-500	9 (21)
501-1,000	none
1,001-5,000	4 (9)
5,001-10,000	3 (7)
Don't Know	5 (12)

Table 100. Distribution of number of interactive connect hours by faculty during 1977-78, as reported by number and (percent) of 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide access to computers.

500 or less, and the average number of faculty interactive connect hours was 500 or less. See Tables 99 and 100.

G. Types of Student and Faculty Use of Computing

Directors of academic computer centers were asked to estimate the percentage of students and faculty at their institutions who use computers for various purposes. Frequency distributions for the estimated percentages of students who use computers for certain purposes are given in Table 101, and for faculty in Table 102.

All the computing center directors whose institutions provide access to computers reported that some students at their institutions use computers for learning about computers and computer programming. In most cases, the estimated percentage of students at any institution who used computers for learning about computers or computer programming was low. Over half the directors of academic computing estimated that ten percent or fewer of their students had used their computers to learn about computing. Four directors of computer centers reported that 75 percent or more of their students had used their computers for that purpose.

Almost half the computing center directors reported that at least some students at their institutions used computers for computer-assisted instruction. At institutions where students did use computers for computer-assisted instruction, the number of students who did so tended to be quite small. Half the directors of academic computing centers where computer-assisted instruction was reported to be in use, estimated that five percent or fewer students used it. One computing center director reported more than 90 percent of students at his or her institution were using computer-assisted instruction. Two other directors reported between fifty and seventy percent of their students using computer-assisted instruction.

Number and (percent)* of Directors of Academic Computer Centers Who Report that Students Use Computers for Various Purposes						
Percent of Students	Type of Student Use					
	Learning about Computers and Computer Programming	Computer-Assisted Instruction	Coursework Problem Solving	Research	Games or Experiments	Other
0		15 (27)	9 (16)	17 (31)	15 (27)	
1-5	9 (21)	13 (23)	15 (27)	20 (37)	15 (27)	
6-10	15 (35)	5 (9)	8 (15)	2 (4)	4 (7)	
11-15	7 (16)	1 (2)	3 (6)		3 (6)	
16-20	3 (7)	2 (4)	4 (7)		1 (2)	
21-25			1 (2)			1 (2)
26-30	1 (2)					
31-35	2 (5)					
36-40	1 (2)	1 (2)				
41-50	1 (2)	1 (2)				
51-60		1 (2)				
61-70		1 (2)				
71-80	1 (2)		1 (2)			
81-90	2 (5)				1 (2)	
91-100	1 (2)	1 (2)				

Table 101. Distribution of percentages of students who use computers for various purposes, reported by number and (percent) of 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide access to computers.

Number and (percent)* of Directors of Academic Computing Centers Reporting Estimated Percentages of Faculty at their Institutions Who Use Computers for Various Purposes										
Percent of Faculty	Type of Faculty Use									
	Administration of Classes		Class Instruction		Research		Games or Experiment		Other	
0	6	(11)	1	(2)	5	(9)	9	(16)		
1-5	17	(31)	20	(36)	19	(35)	13	(24)		
6-10	8	(15)	10	(19)	6	(11)	2	(4)	1	(2)
11-20			1	(2)	2	(4)	1	(2)		
21-30	1	(2)	1	(2)						
81-90	1	(2)								

Table 102. Distribution of percentages of faculty who use computers for various purposes, as reported by number and (percent) of 55 directors of academic computing centers in minority higher education institutions. Data collected April, 1979.

* Percent (rounded) of directors of academic computing centers at institutions that provide access to computers.

About three-fourths the directors of academic computing estimated that some students at their institutions used computers for problem solving related to their coursework. One of those directors reported over seventy percent of his or her students using computers for problem solving. The others all reported twenty-five percent or fewer of their students using computers for coursework problems. The average estimate was just over five percent of students engaged in problem solving with computers.

About half the computer center directors whose institutions have access to computers estimated that a few students at their institutions use computers for research. Estimates of the percent of students who use computers as research tools ranged from one percent to ten percent of students enrolled at each institution, with the largest group of computing directors reporting that fewer than five percent of their students had been so engaged.

Games and experiments with computers involved more students than did research. Just over half the computer center directors whose institutions have access to computers reported that at least some of their students engaged in computer games and experiments. One center director estimated between 80 and 90 percent of his or her students so engaged. Most computing center directors noted that twenty percent or fewer of their students used computers for games and experiments. The average estimate was somewhat under five percent of students.

One computing center director estimated that about a fourth of the students at his of her institution used computers for purposes other than those already noted. No other computing center directors listed students engaged in additional computing tasks.

According to directors of academic computing centers, faculty use of computer may have been more limited than student use. At institutions which provide access to computers, sixty percent of computer center directors estimated that at least some of their faculty members currently used computers for administration of classes, including such chores as scoring tests and recording students' progress. At one institution, between eighty and ninety percent of faculty were estimated to use computers for class administration. At all other institutions, computers were estimated to be used for class administration by thirty percent or less of faculty members. With only 27 of the 55 participating directors of academic computing centers reporting that any of their faculty used computers for class administration, generalizations should be made with caution. Seventeen of those twenty-seven directors reported that five percent or fewer of their colleagues used computers for class administration.

Three-fourths of the directors of computing centers at institutions that have computers reported that some faculty members used computers for class instruction. No computing center director indicated that more than 30 percent of instructors at his or her institution used computers for such purposes as demonstration or simulation for classroom instruction. The largest group, 36 percent of all participating computing directors reported that less than five percent of faculty at their institutions used computers for class instruction. An additional 19 percent of computing center directors reported between six and ten percent of their faculty using computers for instruction.

About sixty percent of directors of academic computing centers at institutions that provide access to computers reported that at least some of their faculty used computers as research tools. The largest estimate reported was twenty percent of faculty at any institution using computers for research. The largest group of computing directors, 35 percent, reported five percent or fewer of their colleagues using computers as research tools.

Sixteen computing directors indicated that faculty at their institutions used computers for games and experimentation. Half of those said five percent or fewer faculty engaged in computer games or experiments. One computing center director reported as many as twenty percent of faculty at one institution using computers for games or experiments, the highest estimate given.

On computer center director reported between six and ten percent of faculty at one institution using computers for purposes other than those already discussed. The purpose was not reported. No other center directors mentioned faculty at their institutions using computers for additional purposes.

H. Attitudes Toward Academic Computing

Presidents or chancellors, deans or academic vice presidents, and heads of science departments were asked to state their degrees of agreement with several statements about the value of academic computing at their institutions. Summaries of these opinions are given in Tables 103 to 107.

Presidents or chancellors and deans or academic vice presidents were asked to express their opinion on the statement "Many students would (or do) benefit from a computer science program at this institution." Ninety percent of presidents or chancellors marked either "agree" or "strongly agree" to that statement. Fifty-eight percent marked "strongly agree." Eight percent of presidents or chancellors noted disagreement with the statement that students at their institution benefit from a computer. One reported no opinion. Eighty-three percent of deans or academic vice presidents reported that they agreed with the statement. Thirty-six percent marked "strongly agree," forty-seven percent marked "agree." Fourteen percent of deans or academic vice presidents noted that they disagreed that computers benefit students at their institutions. Four percent of the deans or academic vice presidents reported no opinion.

Number and (Percent) of Two Types of Respondents Reporting their Opinions on the Statement that Students Benefit from Computer Science		
Opinion	Number and (Percent) of Presidents or Chancellors	Number and (Percent) of Deans or Academic Vice Presidents
Strongly Agree	56 (58)	30 (36)
Agree	31 (32)	39 (47)
Disagree	5 (5)	8 (10)
Strongly Disagree	3 (3)	3 (4)
No Opinion	1 (1)	3 (4)

Table 103. Number and (percent) of 96 presidents or chancellors and 83 deans or academic vice presidents in minority higher education institutions reporting opinions on the statement "Many students would (or do) benefit from a computer science program at this institution." Data collected April, 1979.

Number and (Percent) of Two Types of Respondents Reporting Their Opinions on the Statement that Computer Science Attracts Good Students				
Opinion	Number and (Percent) of Presidents or Chancellors		Number and (Percent) of Deans or Academic Vice Presidents	
Strongly Agree	50	(52)	23	(28)
Agree	38	(40)	43	(52)
Disagree	8	(8)	6	(7)
Strongly Disagree	None		3	(4)
No Opinion	None		7	(8)

Table 104. Number and (percent) of 96 presidents or chancellors and 83 deans or academic vice presidents in minority higher education institutions, reporting opinions on the statement "A computer science curriculum at this institution would (or does) attract many good students." Data collected April, 1979.

Number and (percent) of Three Types of Respondents Reporting their Opinions on a Statement that Computer Assisted Instruction is of Little Value in Higher Education

Opinion	Number and (Percent) of Presidents or Chancellors		Number and (Percent) of Deans or Academic Vice Presidents		Number and (Percent) of Science Department Heads	
Strongly Agree	1	(1)	3	(4)	6	(3)
Agree	3	(3)	2	(2)	11	(6)
Disagree	32	(33)	33	(40)	64	(36)
Strongly Disagree	57	(59)	38	(46)	89	(50)
No Opinion	3	(3)	6	(7)	7	(4)

Table 105. Number and (percent) of 96 presidents or chancellors, 83 deans or academic vice presidents and 178 heads of science departments in minority higher education institutions reporting opinions on the statement "Computer-assisted instruction has little value in higher education." Data collected April, 1979.

Number and (percent) of Three Types of Respondents Reporting their Opinions on a Statement that Faculty Research Benefits by Access to Computers

Opinion	Number and (Percent) of Presidents or Chancellors	Number and (Percent) of Deans or Academic Vice Presidents	Number and (Percent) of Science Department Heads
Strongly Agree	25 (26)	16 (19)	55 (33)
Agree	54 (56)	50 (60)	73 (41)
Disagree	5 (5)	3 (4)	7 (4)
Strongly Disagree	3 (3)	2 (2)	8 (5)
No Opinion	9 (9)	11 (13)	34 (19)

Table 106. Number and (percent) of 96 presidents or chancellors, 83 deans or academic vice presidents and 178 heads of science departments in minority higher education institutions, reporting opinions on the statement "The quality of faculty research at this institution is (or would be) enhanced by the use of computers." Data collected April, 1979.

Number and (Percent) of Three Types of Respondents Reporting their Opinions on a Statement that Instruction in Computing Should be Given Low Budget Priority						
Opinion	Number and (Percent) of Presidents or Chancellors		Number and (Percent) of Deans or Academic Vice Presidents		Number and (Percent) of Science Department Heads	
Strongly Agree	1	(1)	1	(1)	4	(2)
Agree	2	(2)	7	(8)	16	(9)
Disagree	48	(50)	48	(58)	84	(47)
Strongly Disagree	41	(43)	21	(25)	64	(37)
No Opinion	4	(4)	5	(6)	8	(4)

Table 107. Number and (percent) of 96 presidents or chancellors, 83 deans or academic vice presidents and 178 heads of science departments in minority higher education institutions reporting opinions on the statement "In allocating . . . funds, instructional computing should be given low priority." Data collected April, 1979.

When presented with a statement that computer science attracts good students, ninety-two percent of presidents or chancellors indicated some degree of agreement, and eighty percent of deans or academic vice presidents noted agreement. Presidents or chancellors were more emphatic, with fifty-two percent noting that they strongly agree that computer science attracts good students, while twenty-eight percent of deans indicated that they were in strong agreement with the statement. Eight percent of presidents or chancellors noted that they disagreed with the statement, though none indicated that they strongly disagreed. No presidents or chancellors marked the "no opinion" option. Eleven percent of deans or academic vice-presidents indicated that they disagreed that computer science attracted good students, and seven percent reported no opinion.

When presented with a statement that computer-assisted instruction is of little value in higher education, the overwhelming majority of presidents or chancellors, deans or academic vice-presidents and science department heads noted disagreement or strong disagreement. A total of ninety-two percent of presidents or chancellors marked negative options, with fifty-nine percent indicating that they strongly disagreed and thirty-three percent noting that they disagreed. Eighty-six percent of deans or academic vice presidents and eighty-six percent of science department heads marked negative options. Forty-six precent of deans or academic vice presidents marked strongly disagree, and forty percent marked disagree. Fifty percent of heads of science departments strongly disagreed and thirty-six percent disagreed. Four percent of presidents or chancellors indicated that they were in agreement with the statement that computer assisted instruction is of little value. Six percent of deans or academic vice presidents, and nine percent of science department heads agreed with the statement. No opinion was reported by three percent of presidents or chancellors, seven percent of deans or academic vice presidents and four percent of heads of science departments.

Large numbers of presidents or chancellors, deans or academic vice presidents and science department heads agreed that faculty research benefits when access to computers is provided. Eighty-two percent of presidents or chancellors noted positive opinions, with twenty-six percent in strong agreement and fifty-six percent in agreement. Seventy-nine percent of deans or academic vice presidents checked favorable options. Sixty percent reported that they agreed and nineteen percent reported they strongly agreed. Seventy-two percent of science department heads reported the opinion that computers are beneficial to faculty research, with forty-one percent reporting that they strongly agreed with the statement and thirty-one percent reporting that they agreed. Disagreement or strong disagreement was noted by eight percent of presidents or chancellors, six percent of deans or academic vice presidents and nine percent of science department heads. Some indecision was indicated on this question, by nine percent of presidents or chancellors, thirteen percent of deans or academic vice presidents and nineteen percent of science department heads who reported that they had no opinion.

Very large majorities of the three responding groups of institutional officials indicated that instruction in computing should be given high budget priority. When presented with the statement that instruction in computing should be given low budget priority, over eighty percent of each group noted disagreement or strong disagreement. Fifty percent of presidents or chancellors disagreed and forty-three percent indicated that they strongly disagreed. Fifty-eight percent of deans or academic vice presidents disagreed, and twenty-five percent disagreed strongly. Forty-seven percent of science department heads indicated that they disagreed and another thirty-seven percent strongly disagreed. Agreement was noted by three percent of presidents or chancellors, nine percent of deans or academic vice presidents and eleven percent of heads of science departments. Four percent of science department heads and presidents or chancellors and six percent of deans or academic vice presidents reported no opinion.

Responses to the opinion questions suggest that computers are seen to be useful tools by presidents or chancellors, deans or academic vice presidents and heads of science departments at minority institutions. Eighty percent or more of each type of personnel reported that they believe computer science programs are beneficial to students, attract good students, and deserve high budget priority. Over eighty percent of each group indicated disagreement with the contention that computer assisted instruction is not valuable in higher education. Over seventy percent of each group indicated agreement with the statement that access to computers is beneficial to faculty research.

III. Desired Academic Computing Status, 1981-82

Directors of academic computing centers were asked to provide a variety of information on "the status of academic computing that would be realistically desirable for your institution by the 1981-82 academic year." Specific questions covered such components of computing as central computers, personal computers, input/output devices, card processing devices, computer languages, and packaged computer programs. In addition, presidents or chancellors, academic vice presidents or deans, and heads of science departments were asked to respond to a number of questions on the level of access to academic computing they desired for their students and faculties by 1981-82, and the types of academic computing activities they envisioned for their students and faculties by 1981-82. These topics are discussed in this section under the respective headings "Hardware and Equipment," "Computing Software," and "Student and Faculty Skills, Access to and Use of Computers."

A. Hardware and Equipment

Fifty-two directors of academic computing centers provided responses to a question on the availability of computing hardware for academic purposes at their institutions by 1981-82. Since the question provided a large number of options, it is shown in its entirety in Figure 1, below. Responses to this question varied almost as widely as the range of options permitted. No more than four computing center directors selected any one of the eleven specific options given, or any combination of the options. Table 108 provides a complete frequency distribution of the responses to each option and combination. Only three computing center directors desired hardware that would support batch processing alone (less than six percent of those responding). Fourteen directors (27 percent of the respondents) indicated a preference for some

31. In your judgment, by 1981-82, what type(s) of computing hardware should students and/or faculty at your institution be able to use for academic purposes? *(Mark only ONE of the following options):*

A. ___ Large batch (more than 500K bytes of main memory; specify: ____K)
B. ___ Medium batch (256-500K bytes of main memory)
C. ___ Small batch (less than 256K bytes of main memory)
D. ___ Interactive with more than 50 terminals (specify number: ____)
E. ___ Interactive with 33-50 terminals
F. ___ Interactive with 17-32 terminals
G. ___ Interactive with 9-16 terminals
H. ___ Interactive with 1-8 terminals
I. ___ Personal computers (at least 32 available; specify: ________)
J. ___ Personal computers (9-16 available)
K. ___ Personal computers (1-8 available)
L. ___ Other (Specify: ______________________________)
M. ___ Some combination of the above (If so, specify: ________________
____
____)

Figure 1. Question 31 on Academic Computing Center Director's Questionnaire, regarding availability of computing hardware, 1981-82.

```
HARU81    WHAT HARDWARE IS NEEDED BY 1981-82

     CODE
        I
     1. ****** (      1)
        I  LARGE   BATCH- A
        I
        I
     3. *********** (      2)
        I  SMALL   BATCH- C
        I
        I
     4. ***************** (      3)
        I  INTERAC-TIVE >50 - D
        I
        I
     5. ****** (      1)
        I  INTERACT 33-50- E
        I
        I
     6. ********************** (      4)
        I  INTERACT 17-32- F
        I
        I
     7. *********** (      2)
        I  INTERACT 9-16 - G
        I
        I
     8. ********************** (      4)
        I  INTERACT 1-8 - H
        I
        I
     9. *********** (      2)
        I  >32 PRSN COMPUTE - I
        I
        I
    10. ****** (      1)
        I  9-16 PRS COMPUT - J
        I
        I
    11. *********** (      2)
        I  1-8 PRSN COMPUTE  - K
        I
        I
    12. ****** (      1)
        I  OTHERS  - L
        I
```

Table 108 .Distribution of academic computer center directors' desires for academic computing hardware by 1981-82 in 52 minority higher education institutions, Spring, 1979.

```
        I
  13.   ****** (      1)
        I  C,H,J
        I
        I
  14.   *********** (      2)
        I  C,H
        I
        I
  15.   ****** (      1)
        I  SMALLBAT REMOTE
        I
        I
  16.   ****** (      1)
        I  A,E,J
        I
        I
  17.   ****** (      1)
        I  A,F,K
        I
        I
  18.   ****** (      1)
        I  C,F,J
        I
        I
  19.   ****** (      1)
        I  G,I
        I
        I
  20.   *********** (      2)
        I  E,K
        I
        I
  21.   ****** (      1)
        I  B,G,K
        I
        I
  22.   *********** (      2)
        I  G,K
        I
        I
  23.   ****** (      1)
        I  A,F
        I
        I
  24.   ****** (      1)
        I  B,F
        I
```

Table108 . Distribution of Academic computer center directors' desires for academic computing hardware by 1981-82 in 52 minority higher education institutions, Spring, 1979. (continued)

```
           I
      25.  ****** (      1)
           I   B,H
           I
           I
      26.  ****** (      1)
           I   H,K
           I
           I
      27.  ****** (      1)
           I   C,G,K
           I
           I
      28.  *********** (      2)
           I   A,D
           I
           I
      29.  *********** (      2)
           I   B,E,K
           I
           I
      30.  ****** (      1)
           I   A,B,C,F
           I
           I
      31.  ****** (      1)
           I   C,G
           I
           I
      32.  ****** (      1)
           I   B,E
           I
           I
      33.  ****** (      1)
           I   B,F,K
           I
           I
      34.  ****** (      1)
           I   B,E,J
           I
           I
      35.  ****** (      1)
           I   F,J
           I
           I
      36.  ****** (      1)
           I
           I
           I
     999.  **************** (      3)
 (MISSING) I
           I
           I.........I.........I.........I.........I.........I
           0         2         4         6         8        10
           FREQUENCY
```

Table 108. Distribution of academic computer center directors' desires for academic computing hardware by 1981-82 in 52 minority higher education institutions, Spring, 1979. (continued)

form of interactive computing capability alone, and five directors (almost 10 percent of the respondents) indicated a preference for some number of personal computers alone. All of the others expressed desires for various combinations of batch, interactive, and personal computing hardware by 1981-82. Ten directors (just over 19 percent of respondents) indicated a preference for some combination of batch-capable and interactive computing hardware, and an additional seven (13.5 percent of respondents) preferred a combination of interactive and personal computing hardware by 1981-82. Ten more computing center directors specified a combination of all three types of hardware for their institutions (batch, interactive, and personal) by 1981-82.

Table 109 summarizes the responses of 55 directors of academic computing centers to a question on the types of input/output devices that should be available to faculty or students at their institutions for purposes of academic computing by 1981-82. Almost all of the directors expressed the desire for one or more on-line devices to handle data from punched cards, for some number of remote data terminals, or for some devices to output data in print, or on magnetic tape. Line printers, teletypes, and CRT terminals topped the list of desirable on-line input/output devices specified by these directors, with relatively fewer specifying devices to handle punched paper tape, on-line card punching, and on-line plotting of data. Two computing center directors specified a desire for disc drive equipment by 1981-82, by writing this specification in the "other" category of the question on input/output devices.

In addition to indicating the types of input/output devices that should be available to faculty and students at their institutions by 1981-82, academic computing center directors were asked to specify the numbers of each type of device that should be available. Distributions of their responses are reported in Tables 110 through 119. In general, it appears that the equipment goals of

Type of Input/Output Device	Number and Percent ( ) of Computer Center Directors Specifying the Device for Academic Computing by 1981-82
Card Reader	39 (70.9)
Punched Paper Tape Reader or Punch	13 (23.6)
Teletype or Printing Terminal	45 (81.8)
Optical Character Scanner (On-Line)	24 (43.6)
Line Printer	46 (83.6)
On-Line Card Punch	17 (30.9)
Magnetic Tape Drive	37 (67.3)
Video Display Terminal (CRT) -- Without Graphics	44 (80.0)
Graphic CRT Terminal	31 (56.4)
On-Line Plotter (Hard Copy)	29 (52.7)

Table 109. Number and percent of directors of academic computing centers in 55 minority higher education institutions indicating preferences for various input/output devices for academic computing in their institutions by 1981-82.

NCR81 NUMBER CARDREADERS NEEDED 1981-82

```
                                                RELATIVE   ADJUSTED    CUM
                                     ABSOLUTE     FREQ       FREQ      FREQ
~~CATEGORY LABEL~~            CODE     FREQ      (PCT)      (PCT)     (PCT)

                                1.       28       50.9       73.7      73.7

                                2.        5        9.1       13.2      86.8

                                3.        3        5.5        7.9      94.7

                                5.        1        1.8        2.6      97.4

                                8.        1        1.8        2.6     100.0

                              999.       17       30.9    MISSING     100.0
                                     ------     ------     ------
                             TOTAL       55      100.0      100.0
```

Table 110. Distribution of number of card readers desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

NPPI81 NUM PUNCHED PAPER READER & PUNCH NEEDED

~~CATEGORY LABEL~~	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	0.	1	1.8	7.7	7.7
	1.	8	14.5	61.5	69.2
	2.	2	3.6	15.4	84.6
	5.	1	1.8	7.7	92.3
	8.	1	1.8	7.7	100.0
	999.	42	76.4	MISSING	100.0
		------	------	------	
	TOTAL	55	100.0	100.0	

Table 111. Distribution of number of punched paper tape readers or punches desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

```
NTTT81    NUM TELETYPES OR PRINT TERMS NEEDED

                                                   RELATIVE   ADJUSTED      CUM
                                       ABSOLUTE      FREQ       FREQ       FREQ
CATEGORY LABEL                CODE       FREQ       (PCT)      (PCT)      (PCT)

                                1.          3         5.5        7.0        7.0

                                2.          7        12.7       16.3       23.3

                                3.          5         9.1       11.6       34.9

                                4.          6        10.9       14.0       48.8

                                5.          3         5.5        7.0       55.8

                                8.          4         7.3        9.3       65.1

                                9.          1         1.8        2.3       67.4

                               10.          2         3.6        4.7       72.1

                               15.          1         1.8        2.3       74.4

                               20.          2         3.6        4.7       79.1

                               25.          3         5.5        7.0       86.0

                               30.          2         3.6        4.7       90.7

                               40.          1         1.8        2.3       93.0

                               50.          1         1.8        2.3       95.3

                               70.          1         1.8        2.3       97.7

                              200.          1         1.8        2.3      100.0

                              999.         12        21.8    MISSING      100.0
                                       ------      ------     ------
                             TOTAL         55       100.0      100.0
```

Table 112 . Distribution of number of teletypes or printing terminals desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

NOCS81 NUM OPTICAL CHARACTE SCANNERS NEEDED

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	1.	19	34.5	86.4	86.4
	2.	1	1.8	4.5	90.9
	8.	1	1.8	4.5	95.5
	100.	1	1.8	4.5	100.0
	999.	33	60.0	MISSING	100.0
	TOTAL	55	100.0	100.0	

Table 113 . Distribution of number of optical character scanners (on-line) desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

```
08/30/79          FILE - COMPCENT - CREATED 08/30/79          PAGE 164

NLP81      NUMBER LINE PRINTERS NEEDED

                                                RELATIVE   ADJUSTED    CUM
                                    ABSOLUTE      FREQ       FREQ      FREQ
CATEGORY LABEL              CODE      FREQ        (PCT)      (PCT)     (PCT)

                              1.        23        41.8       53.5      53.5

                              2.        15        27.3       34.9      88.4

                              3.         2         3.6        4.7      93.0

                              4.         2         3.6        4.7      97.7

                            100.         1         1.8        2.3     100.0

                            999.        12        21.8     MISSING    100.0
                                    ------      ------     ------
                           TOTAL        55       100.0      100.0
```

Table 114. Distribution of number of line printers desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

```
NOLP81     NUM ON-LINE CARD PUNCHES NEEDED

                                                       RELATIVE   ADJUSTED     CUM
                                           ABSOLUTE      FREQ       FREQ       FREQ
CATEGORY LABEL                     CODE      FREQ       (PCT)      (PCT)      (PCT)

                                     1.        11        20.0       78.6       78.6

                                     2.         2         3.6       14.3       92.9

                                   100.         1         1.8        7.1      100.0

                                   999.        41        74.5    MISSING      100.0
                                             ------    ------     ------
                                  TOTAL        55       100.0      100.0
```

Table 115 . Distribution of number of on-line card punches desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

```
08/30/79           FILE - COMPCENT - CREATED 08/30/79            PAGE  166

NMT81      NUM MAGNETIC TAPE DRIVE NEEDED

                                                RELATIVE   ADJUSTED     CUM
                                     ABSOLUTE     FREQ       FREQ      FREQ
CATEGORY LABEL                CODE     FREQ      (PCT)      (PCT)     (PCT)

                                1.       16      29.1       47.1      47.1

                                2.       10      18.2       29.4      76.5

                                3.        4       7.3       11.8      88.2

                                4.        1       1.8        2.9      91.2

                                5.        2       3.6        5.9      97.1

                              102.        1       1.8        2.9     100.0

                              999.       21      38.2    MISSING     100.0
                                      ------    ------     ------
                             TOTAL       55     100.0      100.0
```

Table 116. Distribution of number of magnetic tape drives desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

```
NCR181     NUM GRAPHICLESS CRTS NEEDED

                   ADJ  CUM                    ADJ  CUM                     ADJ  CUM
  CODE     FREQ    PCT  PCT     CODE    FREQ   PCT  PCT     CODE     FREQ   PCT  PCT

    1.        2      5    5      12.       3     7   50      25.        4    10   85
    3.        3      7   13      15.       3     7   57      30.        2     5   90
    4.        6     15   27      16.       2     5   63      40.        1     2   92
    5.        2      5   32      20.       3     7   70      65.        1     2   95
    8.        2      5   38      23.       1     2   72      75.        1     2   97
   10.        2      5   42      24.       1     2   75     100.        1     2  100

                          M I S S I N G   D A T A
  CODE     FREQ                 CODE    FREQ                CODE     FREQ

  999.       15
```

Table 117. Distribution of number of video display terminals (CRT) without graphics desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

```
NGCRT81   NUM CRTS WITH GRAPHICS NEEDED

                                                  RELATIVE   ADJUSTED     CUM
                                      ABSOLUTE      FREQ       FREQ       FREQ
CATEGORY LABEL                 CODE     FREQ        (PCT)      (PCT)      (PCT)

                                 1.       12        21.8       40.0       40.0

                                 2.        6        10.9       20.0       60.0

                                 3.        2         3.6        6.7       66.7

                                 4.        3         5.5       10.0       76.7

                                 8.        1         1.8        3.3       80.0

                                10.        1         1.8        3.3       83.3

                                15.        2         3.6        6.7       90.0

                                18.        1         1.8        3.3       93.3

                                20.        1         1.8        3.3       96.7

                               100.        1         1.8        3.3      100.0

                               999.       25        45.5    MISSING      100.0
                                      ------      ------     ------
                              TOTAL       55       100.0      100.0
```

Table 118 Distribution of number of graphic CRT terminals desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

NPLT81 NUMBER ON-LINE PLOTTERS NEEDED

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	1.	23	41.8	92.0	92.0
	2.	2	3.6	8.0	100.0
	999.	30	54.5	MISSING	100.0
	TOTAL	55	100.0	100.0	

Table 119. Distribution of number of on-line plotters (hard copy) desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

these computing center directors are modest. Although large numbers of some types of terminals were specified, most directors indicated the need for very small numbers of centralized units, such as card readers and line printers. The reader should note that the code "999" indicates non-response, and that data reported for one respondent (e.g. the specification of 102 magnetic tape drives) are probably in error. The large numbers of non-responses to this question are expected, since indication of the number of devices desired was requested only when a respondent indicated a desire for that type of device.

The responses of 55 academic computing center directors to the question "In your judgment, by 1981-82 which of the following card processing devices should be available to students or faculty for academic computing at your institution?" are summarized in Table 120, By far, the most frequently desired device was the keypunch, with the remaining devices specified by far smaller percentages of the directors. Tables 121 through 124 contain distributions of numbers of card processing devices desired by 1981-82, by type of device. Half the responding computer center directors who indicated the need for one or more keypunches by 1981-82 specified no more than three of the devices, and only nine directors indicated the need for ten or more keypunches (Table 121). Eighty-five percent of directors calling for card sorters suggested that one of them would suffice (Table 122). From Table 123 we see that only one director specified the need for three interpreters by 1981-82, and that the vast majority indicating need for an interpreter specified only one of the devices. The desire for a single off-line optical scanner by 1981-82 was indicated by 15 computer center directors, and only one wanted two of the devices by that academic year (Table 124). Thus we see that computer center directors' desires for card processing devices by 1981-82, like their desires for input/output devices, are quite modest. Numbers of desired units are almost universally small.

Type of Card Processing Device	Number and Percent ( ) of Computer Center Directors Specifying the Device for Academic Computing by 1981-82
Keypunch	39 (75.0)
Card Sorter	21 (41.2)
Interpreter	19 (38.8)
Off-Line Optical Scanner	18 (36.7)

Table 120. Number and percent of directors of academic computing centers indicating preferences for various card processing devices for academic computing in their institutions by 1981-82.

```
NKP81     NUMBER KEYPUNCH NEEDED

                                                   RELATIVE   ADJUSTED     CUM
                                         ABSOLUTE    FREQ       FREQ       FREQ
CATEGORY LABEL                    CODE     FREQ      (PCT)      (PCT)      (PCT)

                                    1.        4        7.3       11.8       11.8

                                    2.        9       16.4       26.5       38.2

                                    3.        4        7.3       11.8       50.0

                                    4.        2        3.6        5.9       55.9

                                    5.        1        1.8        2.9       58.8

                                    6.        1        1.8        2.9       61.8

                                    8.        2        3.6        5.9       67.6

                                   10.        6       10.9       17.6       85.3

                                   12.        2        3.6        5.9       91.2

                                   15.        2        3.6        5.9       97.1

                                   20.        1        1.8        2.9      100.0

                                  999.       21       38.2    MISSING      100.0
                                          ------     ------     ------
                                 TOTAL       55      100.0      100.0
```

Table 121. Distribution of number of keypunches desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

NCS81 NUMBER CARD SORTERS NEEDED

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
	1.	17	30.9	85.0	85.0
	2.	3	5.5	15.0	100.0
	999.	35	63.6	MISSING	100.0
	TOTAL	55	100.0	100.0	

Table 122. Distribution of number of card sorters desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

```
NIN181     NUMBER INTERPRETERS NEEDED

                                                    RELATIVE    ADJUSTED      CUM
                                        ABSOLUTE      FREQ        FREQ        FREQ
CATEGORY LABEL                 CODE       FREQ       (PCT)       (PCT)       (PCT)

                                 1.         12        21.8        70.6        70.6

                                 2.          4         7.3        23.5        94.1

                                 3.          1         1.8         5.9       100.0

                               999.         38        69.1     MISSING       100.0
                                         -------     -------     -------
                              TOTAL         55       100.0       100.0
```

Table 123. Distribution of number of interpreters desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

```
NOLS81     NUMBER OFF-LINE OPTICAL SCANNERS NEEDED

                                                  RELATIVE   ADJUSTED     CUM
                                       ABSOLUTE     FREQ       FREQ       FREQ
CATEGORY LABEL                 CODE      FREQ       (PCT)      (PCT)      (PCT)

                                 1.        15        27.3       93.8       93.8

                                 2.         1         1.8        6.3      100.0

                               999.        39        70.9     MISSING     100.0
                                       -------    -------    -------
                               TOTAL       55       100.0      100.0
```

Table 124. Distribution of number of off-line optical scanners desired by 55 academic computing directors by 1981-82, as of Spring, 1979.

B. Computing Software

Directors of academic computing centers were asked two questions on the types of computing software that should be available to faculty or students in their institutions by 1981-82 for academic computing purposes. The first provided a list of specific computer languages, and asked directors to specify whether each language should or should not be made available by the 1981-82 academic year. Directors were also given the opportunity to add to the list provided in the question. The second question contained a list of packaged computer programs used for statistical analyses of data and data file construction and manipulation. Again, computing center directors were asked to specify whether each package should or should not be made available to faculty or students in their institutions by 1981-82. As in the first question concerning computing software, the opportunity to add to the list of packaged computer programs was provided.

Table 125 contains a summary of computer center director's judgments on the computing languages that should be available to faculty or students in their institutions for academic computing by 1981-82. Two languages, BASIC and FORTRAN, were judged to be necessary by 1981-82 by more than 90 percent of responding directors. COBOL was judged similarly by almost 85 percent of responding directors, and ASSEMBLER was specified by just under three-fourths. Only two other languages, RPG and PL/1, were identified as being desirable by 1981-82 by a majority of responding directors.

If the data in Table 125 are compared with those presented in Table 60 of Section II, summarizing computer center director's reports on computing languages presently available in their institutions for academic purposes, some interesting results emerge. Sixteen more directors than report the present availability of PASCAL (29 percent of the 55) would like that language to be

Computer Language	Number and Percent ( ) Who Desire the Language	Number and Percent ( ) Who Do Not Desire the Language	Number and Percent ( ) Responding "Don't Know"
BASIC	51 (92.7)	3 (5.5)	1 (1.8)
PASCAL	23 (41.8)	22 (40.0)	10 (18.2)
FORTRAN	51 (92.7)	4 (7.3)	0 (0.0)
PL/1	30 (54.5)	19 (34.5)	6 (10.9)
COBOL	46 (83.6)	7 (12.7)	2 (3.6)
APL	25 (45.5)	19 (34.5)	11 (20.0)
RPG	34 (63.0)	14 (25.9)	6 (11.1)
PILOT	5 (9.3)	32 (59.3)	17 (31.5)
IDF	6 (11.1)	29 (53.7)	19 (35.2)
COURSEWRITER	19 (34.5)	22 (40.0)	14 (25.5)
ASSEMBLER	41 (74.5)	10 (18.2)	4 (7.3)
Additional Languages Specified by One or More Directors:			
DATASHARE	1 (1.8)		
SNOBOL, LISP or DOD1	2 (3.6)		
Other Language (Unspec.)	1 (1.8)		

Table 125 . Number and percent of directors of academic computing centers in 55 minority higher education institutions indicating preferences for various computer languages for academic computing in their institutions by 1981-82. Note: Percentages are adjusted for non-response.

available to faculty and students in their institutions by 1981-82. Corresponding desires for increases in the availability of other languages are: FORTRAN — an increase of 15 directors (27 percent of the 55) desiring availability; COURSEWRITER — an increase of 15 directors (27 percent of the 55) desiring availability; COBOL — an increase of 11 directors (20 percent of the 55) desiring availability; PL/1 — an increase of 10 directors (18 percent of the 55) desiring availability; ASSEMBLER — an increase of 9 directors (16 percent of the 55) desiring availability. Desired increases in the availability of all other languages involved no more than six directors.

With few exceptions, the languages most desired by academic computing directors for 1981-82 are those most widely available at present. One exception to this rule is COURSEWRITER, suggesting a perceived need to use computers for direct instruction in a variety of subjects by 1981-82. The sustained popularity of BASIC and FORTRAN suggests continued use of personal computing, interactive computing on relatively small systems, and continued popularity of large-scale processors as well.

Computer center director's desires concerning the availability of packaged computer programs by 1981-82 are summarized in Table 126. Of all statistical computing packages, SPSS was judged to be most desirable by a large percentage of computing center directors. It is the only packaged program specified for 1981-82 by a majority of responding directors (50.4 percent). The CONVERSATIONAL SPSS, BMD, SAS, and SSP packages were next in order of preference, being specified by 30 percent to 45 percent of responding directors. With the exception of SPSS, about a third of the responding directors indicated that they did not think the listed computer packages should be available in their institutions by 1981-82, and an additional 20 percent to 40 percent didn't know whether these packages should be available by that academic year. Although it

Packaged Computer Program	Number and Percent ( ) Who Desire the Program	Number and Percent ( ) Who Do Not Desire the Program	Number and Percent ( ) Responding "Don't Know"
SPSS	32 (60.4)	14 (26.4)	7 (12.7)
CONVERSATIONAL SPSS	22 (44.9)	17 (34.7)	10 (20.4)
SAS	16 (33.3)	17 (35.4)	15 (31.3)
BMD	19 (39.6)	15 (31.3)	14 (29.2)
SSP	15 (30.6)	19 (38.8)	15 (30.6)
OSIRIS	7 (15.2)	21 (45.7)	18 (39.1)
Additional Packaged Programs Specified by One of More Directors:			
COSAP	1 (1.8)		
CAI, VOCATIONAL GUIDANCE, or SOCIAL SCIENCE	1 (1.8)		
Other Packaged Programs (Unspecified)	5 (9.1)		

Table 126 . Number and percent of directors of academic computing centers in 55 minority higher education institutions indicating preferences for various packaged computer programs for academic computing in their institutions by 1981-82.
Note: Percentages are adjusted for non-response.

is speculative, it is tempting to conclude that the majority of responding academic computing center directors are not familiar with most of the packaged programs listed, and therefore cannot reflect accurately on their potential utility to faculty and students. A contrary explanation might be the heavy emphasis of most of the sampled institutions on undergraduate education, and the relatively infrequent use of statistical procedures in most undergraduate curricula.

If the results reported in Table 126 are compared to those shown in Table 61 of Section II, the relative popularity of the SPSS programs becomes even more apparent. Thirty-two directors indicated that SPSS should be available in their institutions by 1981-82, and only 23 indicated that the package was currently available. The increase of nine equals 16 percent of the 55 responding directors. The corresponding increase in the number of directors who specify CONVERSATIONAL SPSS for 1981-82, compared to those reporting its present availability (22 versus 11, or an increase of 11), reflects a 20 percent gain. Desired increases in the availability of other packaged programs were considerably smaller.

C. Student and Faculty Skills, Access to and Use of Computers

Presidents or chancellors, academic vice presidents or deans, and heads of science departments in minority higher education institutions were asked to respond to a series of identical or parallel questions on student computing skills, levels of student and faculty access to computing, and levels of student and faculty use of computers that should exist in their institutions by 1981-82. Responses to these questions have been summarized in Tables 127 through 129.

Judgments of presidents or chancellors, academic vice presidents or deans, and heads of science departments on the percentages of students in their institutions (in the case of presidents or chancellors and academic vice presidents or deans) or in their departments (in the case of science department heads) who should have computing skills at various levels, by 1981-82, in order to be able to perform successfully as students, are summarized in Tables 127 through 129 respectively. The response distributions for 96 presidents or chancellors and 83 deans or academic vice presidents are quite similar, with a slight tendency for the former respondents to suggest higher percentages of students with higher-level computing skills. Eighty-one percent of presidents or chancellors judged that at least some percentage of their students should have a general awareness of computers by 1981-82. The corresponding percentage of academic vice presidents or deans who gave that response was 79. Eighty-four percent of both types of respondent judged that at least some percentage of their students should have limited computer skills and experience by 1981-82. Finally, 89 percent of presidents or chancellors and 85 percent of academic vice presidents or deans judged that at least some percentage of their students should have the ability to program a computer by 1981-82, in order to perform successfully as students. It is apparent from these distributions that both types of respondent judged the need for future computing skills to be limited to relatively small percentages of the students they expect to have enrolled by 1981-82. No more than nine percent of either type of respondent judged that computing skills at the general awareness level or above were necessary for 60 percent or more of their students, in their student roles, by 1981-82.

In response to a parallel question on the percentage of students enrolled in their departments who should have computing skills at various levels by 1981-82, heads of science departments expressed the need for higher levels of skills for higher percentages of students, than did either presidents/chancellors or academic vice presidents/deans. These data are summarized in Table 129.

Percent of Students	Level of Computing Skills Desired for Students by 1981-82 in Order to be Able to Perform Successfully as Students							
	No Computer Training or Skills		General Awareness of Computers		Limited Personal Computer Use and Skill		Ability to Program a Computer	
81 - 100	11	(11.5)	4	(4.2)	1	(1.0)	5	(5.2)
61 - 80	11	(11.5)	1	(1.0)	1	(1.0)	2	(2.1)
41 - 60	8	(8.3)	13	(13.5)	11	(11.5)	3	(3.1)
21 - 40	15	(15.6)	28	(29.2)	32	(33.3)	21	(21.9)
1 - 20	21	(21.9)	32	(33.3)	36	(37.5)	54	(56.3)
NONE	30	(31.3)	18	(18.8)	15	(15.6)	11	(11.5)

Table 127. Number and (percent) of 96 presidents or chancellors in minority higher education institutions indicating percent of students enrolled in their institutions in 1981-82 who should have computing skills at various levels in order to perform successfully as students. Data collected in April, 1979.

Percent of Students	Level of Computing Skills Desired for Students by 1981-82 in Order to be Able to Perform Successfully as Students			
	No Computer Training or Skills	General Awareness of Computers	Limited Personal Computer Use and Skill	Ability to Program a Computer
81 - 100	9 (11.2)	2 (2.4)	4 (4.9)	3 (3.7)
61 - 80	6 (7.5)	5 (6.1)	0 (0.0)	0 (0.0)
41 - 60	16 (20.0)	9 (11.0)	5 (6.1)	6 (7.4)
21 - 40	7 (8.7)	21 (25.6)	25 (30.5)	9 (11.1)
1 - 20	23 (28.7)	28 (34.1)	35 (42.7)	51 (63.0)
NONE	19 (23.7)	17 (20.7)	13 (15.9)	12 (14.8)

Table 128. Number and (percent) of 83 deans or academic vice presidents in minority higher education institutions indicating percent of students enrolled in their institutions in 1981-82 who should have computing skills at various levels in order to perform successfully as students. Data collected in April, 1979.

Percent of Students	Level of Computing Skills Desired for Students by 1981-82 in Order to be Able to Perform Successfully as Students			
	No Computer Training or Skills	General Awareness of Computers	Limited Personal Computer Use and Skill	Ability to Program a Computer
81 - 100	18 (10.3)	1 (0.6)	13 (7.4)	16 (9.1)
61 - 80	11 (6.3)	8 (4.6)	20 (11.4)	7 (4.0)
41 - 60	11 (6.3)	17 (9.8)	27 (15.4)	19 (10.9)
21 - 40	15 (8.6)	32 (18.4)	35 (20.0)	34 (19.4)
1 - 20	18 (10.3)	44 (25.3)	42 (24.0)	50 (28.6)
NONE	100 (57.5)	72 (41.4)	38 (21.7)	48 (27.4)

Table 129. Number and (percent) of 178 heads of science departments in minority higher education institutions indicating percent of students enrolled in their departments in 1981-82 who should have computing skills at various levels in order to perform successfully as students. Data collected in April, 1979.

Only 42 percent of science department heads judged that any students in their departments would be able to perform successfully as students without some computer training or skills. Although 68 percent of responding presidents/chancellors judged that no more than 20 percent of students enrolled in their institutions should be able to program a computer by 1981-82 in order to succeed as students, only 56 percent of heads of science departments expressed the same view about students enrolled in their departments. In addition, comparative percentages judging that at least 60 percent of such students should be able to program a computer by 1981-82 are 7.3 for presidents/chancellors and 13.1 for heads of science departments.

Although academic officers in minority higher education institutions might feel that future students do not need computing skills in order to succeed as students, they might judge such skills to be essential to the life success of their graduates. Therefore, presidents or chancellors, academic vice presidents or deans and heads of science departments were asked to judge the percentages of students in their institutions or departments who should have computing skills at various levels, by 1981-82, in order to perform successfully in life after they graduate. Judgments expressed by the three types of respondent are summarized in Tables 130 through 132, respectively.

Once again, the overall distributions of judgments expressed by presidents/chancellors and academic vice presidents/deans are similar. There is a slight tendency for presidents/chancellors to suggest higher levels of computing skills for high percentages of their students than did academic vice presidents/deans. Ninety-one percent of presidents/chancellors suggest that at least some of their students have a general awareness of computers by 1981-82, in order to succeed after they graduate; 63 percent of responding presidents/chancellors suggest that at least 21 percent of their future students have such awareness

(Table 130). In comparison, 54 percent of academic vice presidents/deans expressed this judgment (Table 131). When higher-level computing skills are considered, such as use of existing computing programs or the ability to program a computer, presidents/chancellors called for substantial proportions of their future students with these skills, as did academic vice presidents/deans. For example, twenty-six percent of responding presidents/chancellors suggested that at least 21 percent of students enrolled in 1981-82 should be able to program a computer in order to succeed in life after they graduate. The corresponding percentage of academic vice presidents/deans making the same judgment was 21.

Heads of science departments judged computing skills to be essential to the post-graduation professional success of a very high percentage of students they will enroll by 1981-82. From Table 132we see that 17.5 percent of responding department heads suggested computer programming ability for at least 81 percent of these students. Nearly three-fourths of responding science department heads suggested that some level of computer skill was necessary to the professional success of some percentage of their students: 60 percent specified general awareness for at least some students; 72 percent specified limited personal computer use and skill for at least some students; 80 percent specified the ability to program a computer for at least some students. When comparing the responses of science department heads to those of presidents/chancellors or academic vice presidents/deans, the reader must keep in mind that the referent population of students, as well as the type of respondent, is different. The science department heads were asked to make judgments for students enrolled in their departments by 1981-82, whereas the other academic officers were asked to make judgments for all students enrolled in their institutions by 1981-82. These include non-science students as well as those

Percent of Students	Level of Computing Skills Desired for Students by 1981-82 in Order to be Able to Perform Successfully in Life			
	No Computer Training or Skills	General Awareness of Computers	Limited Personal Computer Use and Skill	Ability to Program a Computer
81 - 100	7 (7.4)	9 (9.4)	2 (2.1)	4 (4.2)
61 - 80	6 (6.3)	4 (4.2)	4 (4.2)	1 (1.0)
41 - 60	7 (7.4)	19 (19.8)	11 (11.5)	3 (3.1)
21 - 40	12 (12.6)	27 (28.1)	26 (27.1)	17 (17.7)
1 - 20	23 (24.2)	27 (28.1)	38 (39.6)	55 (57.3)
NONE	40 (42.1)	9 (9.4)	14 (14.6)	15 (15.6)

Table 130. Number and (percent) of 96 presidents or chancellors in minority higher education institutions indicating percent of students enrolled in their institutions in 1981-82 who should have computing skills at various levels in order to perform successfully in life. Data collected in April, 1979.

Percent of Students	Level of Computing Skills Desired for Students by 1981-82 in Order to be Able to Perform Successfully in Life			
	No Computer Training or Skills	General Awareness of Computers	Limited Personal Computer Use and Skill	Ability to Program a Computer
81 - 100	4 (4.9)	4 (4.9)	3 (3.7)	2 (2.5)
61 - 80	8 (9.9)	5 (6.2)	2 (2.5)	0 (0.0)
41 - 60	12 (14.8)	10 (12.3)	13 (16.0)	7 (8.6)
21 - 40	10 (12.3)	25 (30.9)	18 (22.2)	8 (9.9)
1 - 20	18 (22.2)	26 (32.1)	36 (44.4)	52 (64.2)
NONE	29 (35.8)	11 (13.6)	9 (11.1)	12 (14.8)

Table 131. Number and (percent) of 83 deans or academic vice presidents in minority higher education institutions indicating percent of students enrolled in their institutions in 1981-82 who should have computing skills at various levels in order to perform successfully in life. Data collected in April, 1979.

Percent of Students	Level of Computing Skills Desired for Students by 1981-82 in Order to Perform Successfully as Professionals after Graduation			
	No Computer Training or Skills	General Awareness of Computers	Limited Personal Computer Use and Skill	Ability to Program a Computer
81 - 100	10 (5.6)	6 (3.4)	9 (5.1)	31 (17.5)
61 - 80	9 (5.1)	13 (7.3)	15 (8.5)	7 (4.0)
41 - 60	5 (2.8)	18 (10.2)	26 (14.7)	21 (11.9)
21 - 40	11 (6.2)	28 (15.8)	37 (20.9)	32 (18.1)
1 - 20	16 (9.0)	41 (23.2)	41 (23.2)	50 (28.2)
NONE	126 (71.2)	71 (40.1)	49 (27.7)	36 (20.3)

Table 132. Number and (percent) of 178 heads of science departments in minority higher education institutions indicating percent of students enrolled in their departments in 1981-82 who should have computing skills at various levels in order to perform successfully as professionals after graduation. Data collected in April, 1979.

enrolled in science courses.

If the distributions in Tables 127 through 129 are compared with those in Tables 130 through 132, it becomes clear that each type of respondent judged computer skills and experience to be more important for future students in their post-graduate life roles, than in their student roles. One might infer that these respondents thought it more important that future students learn to use computers as a tool for later life than to use computers as a tool in their learning.

Access to computers desired for students enrolled in 1981-82 is the subject of judgments summarized in Tables 133 through 135. More specifically, the three types of respondents listed above were asked to judge the percentage of students enrolled in their institutions (departments) by 1981-82 who should have access to computers at various levels, in order to complete their classwork and homework assignments. On this question, the distributions of responses provided by presidents/chancellors and by academic vice presidents/deans are virtually indistinguishable. The modal category in both Tables 133 and 134 is "1-20 percent" of students, for all levels of computer access from "limited" to "unlimited". Operational definitions of these categories are provided on the quesionnaires contained in Appendix A. A clear majority of responding presidents/chancellors and academic vice presidents/deans judged that less than a majority of their students enrolled by 1981-82 needed access to computers at any level, for homework or classwork. The same statement could be made about the responses of heads of science departments. However, the distribution for science department heads on this question of student access to computers differs somewhat from those of the other two types of respondent. In the case of "unlimited access," the distribution is more clearly U-shaped. That is, a sizeable percentage of science department heads (14.1) suggested that virtually all students enrolled in 1981-82 have unlimited access to

Percent of Students	Level of Computing Access Desired for Students by 1981-82 to Complete Classwork and Homework Assignments							
	No Access		Limited Access		Moderate Access		Unlimited Access	
81 - 100	12	(12.8)	7	(7.4)	1	(1.1)	4	(4.3)
61 - 80	8	(8.5)	6	(6.3)	2	(2.1)	0	(0.0)
41 - 60	17	(18.1)	13	(13.7)	12	(12.8)	3	(3.2)
21 - 40	10	(10.6)	24	(25.3)	21	(22.3)	10	(10.6)
1 - 20	15	(16.0)	31	(32.6)	39	(41.5)	48	(51.1)
NONE	32	(34.0)	14	(14.7)	19	(20.2)	29	(30.9)

Table 133. Number and (percent) of 96 presidents or chancellors in minority higher education institutions indicating percent of students enrolled in their institutions in 1981-82 who should have access to computers at various levels in order to complete classwork and homework assignments. Data collected in April, 1979.

Percent of Students	Level of Computing Access Desired for Students by 1981-82 to Complete Classwork and Homework Assignments			
	No Access	Limited Access	Moderate Access	Unlimited Access
81 - 100	9 (11.1)	5 (6.2)	1 (1.2)	2 (2.5)
61 - 80	12 (14.8)	5 (6.2)	0 (0.0)	2 (2.5)
41 - 60	13 (16.0)	6 (7.4)	9 (11.1)	6 (7.4)
21 - 40	9 (11.1)	21 (25.9)	19 (23.5)	6 (7.4)
1 - 20	16 (19.8)	29 (35.8)	39 (48.1)	43 (53.1)
NONE	22 (27.2)	15 (18.5)	13 (16.0)	22 (27.2)

Table 134. Number and (percent) of 83 deans or academic vice presidents in minority higher education institutions indicating percent of students enrolled in their institutions in 1981-82 who should have access to computers at various levels in order to complete classwork and homework assignments. Data collected in April, 1979.

computers for their classwork or homework, even though 40 percent of science department heads suggested that no students be given unlimited computer access for that purpose. Somewhat similar divergence among heads of science departments appears when their judgments on percentages of future students who should have "limited" or "moderate" access to computers for homework or classwork is considered (Table 135).

Tables 136 through 138 contain summaries of the judgments of the three types of respondent on the percentages of students enrolled in their institutions by 1981-82, who should use computers at various levels in conjunction with their independent research. The general trends reported above for other questions of judgment on computer engagement by future students hold for this question as well. Distributions of responses by the senior academic officers were very similar (Tables 136 and 137). Heads of science departments judged that higher percentages of students should use computers in conjunction with their own research. When compared to the question on future student access to computers for use in completing their classwork or homework, the percentages of respondents suggesting high levels or percentages of student use of computers in conjunction with their own research were far smaller, for all types of respondent. This can be seen by comparing the response distributions in Tables 133 through 135 with those in Tables 136 through 138.

The three types of respondents were asked to respond "yes" or "no" to the direct question "In your judgment, by 1981-82 should students at your institution have access to computers for unscheduled activities such as experimentations and games?". Their responses are summarized in Table 139. High percentages of all three types of respondent answered this question affirmatively, with nearly three-fourths of presidents/chancellors and academic vice presidents/deans responding "yes", and 86 percent of heads of science departments giving an affirmative response. If these response

Percent of Students	Level of Computing Access Desired for Students by 1981-82 to Complete Classwork and Homework Assignments							
	No Access		Limited Access		Moderate Access		Unlimited Access	
81 - 100	19	(10.7)	9	(5.1)	9	(5.1)	25	(14.1)
61 - 80	16	(9.0)	15	(8.5)	15	(8.5)	6	(3.4)
41 - 60	8	(4.5)	17	(9.6)	26	(14.7)	11	(6.2)
21 - 40	14	(7.9)	29	(16.4)	26	(14.7)	19	(10.7)
1 - 20	16	(9.0)	41	(23.2)	41	(23.2)	45	(25.4)
NONE	104	(58.8)	66	(37.3)	60	(33.9)	71	(40.1)

Table 135. Number and (percent) of 178 heads of science departments in minority higher education institutions indicating percent of students enrolled in their departments in 1981-82 who should have access to computers at various levels in order to complete classwork and homework assignments. Data collected in April, 1979.

Percent of Students	Level of Computing Use Desired for Students by 1981-82, in Conjunction with their Independent Research							
	No Use		Limited Use		Moderate Use		Substantial Use	
81 - 100	34	(36.2)	4	(4.2)	2	(2.1)	1	(1.1)
61 - 80	8	(8.5)	0	(0.0)	0	(0.0)	0	(0.0)
41 - 60	14	(14.9)	13	(13.7)	7	(7.3)	1	(1.1)
21 - 40	6	(6.4)	21	(22.1)	24	(25.0)	10	(10.6)
1 - 20	14	(14.9)	32	(33.7)	32	(33.3)	41	(43.6)
NONE	18	(19.1)	25	(26.3)	29	(30.2)	41	(43.6)

Table 136. Number and (percent) of 96 presidents or chancellors in minority higher education institutions indicating percent of students enrolled in their institutions in 1981-82 who should use computers at various levels in conjunction with their independent research. Data collected in April, 1979.

Percent of Students	Level of Computing Use Desired for Students by 1981-82, in Conjunction with their Independent Research							
	No Use		Limited Use		Moderate Use		Substantial Use	
81 - 100	27	(33.3)	5	(6.2)	2	(2.5)	1	(1.2)
61 - 80	11	(13.6)	4	(4.9)	2	(2.5)	1	(1.2)
41 - 60	7	(8.6)	6	(7.4)	3	(3.7)	1	(1.2)
21 - 40	3	(3.7)	12	(14.8)	16	(19.8)	10	(12.3)
1 - 20	14	(17.3)	34	(42.0)	34	(42.0)	36	(44.4)
NONE	19	(23.5)	20	(24.7)	24	(29.6)	32	(39.5)

Table 137. Number and (percent) of 83 deans or academic vice presidents in minority higher education institutions indicating percent of students enrolled in their institutions in 1981-82 who should use computers at various levels in conjunction with their independent research. Data collected in April, 1979.

Percent of Students	Level of Computing Use Desired for Students by 1981-82, in Conjunction with their Independent Research							
	No Use		Limited Use		Moderate Use		Substantial Use	
81 - 100	48	(27.1)	8	(4.5)	9	(5.1)	9	(5.1)
61 - 80	19	(10.7)	11	(6.2)	9	(5.1)	6	(3.4)
41 - 60	12	(6.8)	14	(7.9)	12	(6.8)	8	(4.5)
21 - 40	10	(5.6)	25	(14.1)	31	(17.5)	16	(9.0)
1 - 20	20	(11.3)	64	(36.2)	52	(29.4)	53	(29.8)
NONE	68	(38.4)	55	(31.1)	64	(36.2)	85	(47.8)

Table 138. Number and (percent) of 178 heads of science departments in minority higher education institutions indicating percent of students enrolled in their departments in 1981-82 who should use computers at various levels in conjunction with their independent research. Data collected in April, 1979.

Response	Type of Respondent		
	President or Chancellor	Academic Vice President or Dean	Head of Science Department
Yes	71 (74.0)	57 (71.2)	151 (85.8)
No	25 (26.0)	23 (28.7)	25 (14.2)

Table 139. Number and (percent) of respondents in minority higher education institutions judging that, by 1981-82, students at their institutions (or in their departments) should or should not have access to computers for unscheduled activities such as experimentation and games, by type of respondent. Data collected in April, 1979.

percentages are compared to those for other questions on future students' access to computers or desired computer skills, differences between the question formats should be kept in mind. The responses reported in Table 139should be interpreted as indicating some, but perhaps far less than all, students should have access to computers for unscheduled activities. In contrast, in earlier questions specific percentages of students who should have access to computers or use computers at various levels were requested.

Presidents/chancellors, academic vice presidents/deans, and heads of science departments were asked to judge the percentages of teaching faculty in their institutions (departments) who should have access to computers, at various levels, for either of two purposes: administrative use in their classes, and instructional use in their classes. The respondents' judgments on these questions are summarized in Tables 140through 145. Comparison of the distributions reported in these tables with those shown in Tables 133through 135 suggests that all three types of respondent would have future faculty given greater access to computers for both purposes than they would have future students given access to computers for use with classwork or homework. It appears that faculty access to computers (at least by 1981-82) is more highly valued by these respondents than is access by future students.

Comparison of the distributions in Tables 140 through 142 with those in Tables 143 through 145 reveals some interesting similarities and differences. Higher percentages of all three types of respondent suggested that nearly all teaching faculty in 1981-82 have access to computers for administrative use in classes than for instructional use in classes. However, higher percentages of all three types of respondent suggested that at least some teaching faculty have access to computers at some level for instructional use in classes.

In responding to both questions, heads of science departments suggested

Percent of Teaching Faculty	Level of Computing Access Desired for Faculty by 1981-82 for Administrative Use in their Classes			
	No Access	Limited Access	Moderate Access	Unlimited Access
81 - 100	9 (9.6)	9 (9.5)	7 (7.3)	13 (13.8)
61 - 80	11 (11.7)	4 (4.2)	2 (2.1)	3 (3.2)
41 - 60	11 (11.7)	7 (7.4)	11 (11.5)	3 (3.2)
21 - 40	2 (2.1)	18 (18.9)	10 (10.4)	9 (9.6)
1 - 20	16 (17.0)	26 (27.4)	32 (33.3)	34 (36.2)
NONE	45 (47.9)	31 (32.6)	32 (33.3)	32 (34.0)

Table 140. Number and (percent) of 96 presidents or chancellors in minority higher education institutions indicating percent of teaching faculty in their institutions in 1981-82 who should have access to computers at various levels for administrative use in their classes. Data collected in April, 1979.

Percent of Teaching Faculty	Level of Computing Access Desired for Faculty by 1981-82 for Administrative Use in their Classes							
	No Access		Limited Access		Moderate Access		Unlimited Access	
81 - 100	11	(13.4)	4	(4.9)	5	(6.1)	14	(17.1)
61 - 80	8	(9.8)	3	(3.7)	2	(2.4)	4	(4.9)
41 - 60	9	(11.0)	8	(9.8)	5	(6.1)	4	(4.9)
21 - 40	5	(6.1)	9	(11.0)	19	(23.2)	7	(8.5)
1 - 20	9	(11.0)	32	(39.0)	25	(30.5)	25	(30.5)
NONE	40	(48.8)	26	(31.7)	26	(31.7)	28	(34.1)

Table 141. Number and (percent) of 83 deans or academic vice presidents in minority higher education institutions indicating percent of teaching faculty in their institutions in 1981-82 who should have access to computers at various levels for administrative use in their classes. Data collected in April, 1979.

Percent of Teaching Faculty	Level of Computing Access Desired for Faculty by 1981-82 for Administrative Use in their Classes			
	No Access	Limited Access	Moderate Access	Unlimited Access
81 - 100	20 (11.3)	18 (10.2)	15 (8.5)	61 (34.5)
61 - 80	7 (4.0)	6 (3.4)	2 (1.1)	7 (4.0)
41 - 60	1 (0.6)	8 (4.5)	19 (10.7)	10 (5.6)
21 - 40	6 (3.4)	22 (12.4)	21 (11.9)	12 (6.8)
1 - 20	4 (2.3)	19 (10.7)	21 (11.9)	19 (10.7)
NONE	139 (78.5)	104 (58.8)	99 (55.9)	68 (38.4)

Table 142. Number and (percent) of 178 heads of science departments in minority higher education institutions indicating percent of teaching faculty in their departments in 1981-82 who should have access to computers at various levels for administrative use in their classes. Data collected in April, 1979.

Percent of Teaching Faculty	Level of Computing Access Desired for Faculty by 1981-82 for Instructional Use in their Classes			
	No Access	Limited Access	Moderate Access	Unlimited Access
81 - 100	8 (8.4)	8 (8.5)	4 (4.3)	8 (8.5)
61 - 80	10 (10.5)	7 (7.4)	2 (2.1)	1 (1.1)
41 - 60	10 (10.5)	9 (9.6)	11 (11.7)	4 (4.3)
21 - 40	10 (10.5)	20 (21.3)	18 (19.1)	10 (10.6)
1 - 20	16 (16.8)	36 (38.3)	35 (37.2)	46 (48.9)
NONE	41 (43.2)	14 (14.9)	24 (25.5)	25 (26.6)

Table 143. Number and (percent) of 96 presidents or chancellors in minority higher education institutions indicating percent of teaching faculty in their institutions in 1981-82 who should have access to computers at various levels for instructional use in their classes. Data collected in April, 1979.

Percent of Teaching Faculty	Level of Computing Access Desired for Faculty by 1981-82 for Instructional Use in their Classes			
	No Access	Limited Access	Moderate Access	Unlimited Access
81 - 100	8 (9.6)	4 (4.9)	2 (2.4)	7 (8.5)
61 - 80	12 (14.5)	4 (4.9)	3 (3.7)	2 (2.4)
41 - 60	13 (15.7)	10 (12.2)	12 (14.6)	4 (4.9)
21 - 40	3 (3.6)	12 (14.6)	16 (19.5)	10 (12.2)
1 - 20	8 (9.6)	36 (43.9)	33 (40.2)	36 (43.9)
NONE	39 (47.0)	16 (19.5)	16 (19.5)	23 (28.0)

Table 144. Number and (percent) of 83 deans or academic vice presidents in minority higher education institutions indicating percent of teaching faculty in their institutions in 1981-82 who should have access to computers at various levels for instructional use in their classes. Data collected in April, 1979.

Percent of Teaching Faculty	Level of Computing Access Desired for Faculty by 1981-82 for Instructional Use in their Classes							
	No Access		Limited Access		Moderate Access		Unlimited Access	
81 - 100	15	(8.5)	15	(8.5)	12	(6.8)	60	(33.9)
61 - 80	8	(4.5)	7	(4.0)	7	(4.0)	5	(2.8)
[illegible]1 - 60	6	(3.4)	13	(7.3)	20	(11.3)	17	(9.6)
21 - 40	3	(1.7)	18	(10.2)	25	(14.1)	9	(5.1)
1 - 20	14	(7.9)	27	(15.3)	20	(11.3)	23	(13.0)
NONE	131	(74.0)	97	(54.8)	93	(52.5)	63	(35.6)

Table 145. Number and (percent) of 178 heads of science departments in minority higher education institutions indicating percent of teaching faculty in their departments in 1981-82 who should have access to computers at various levels for instructional use in their classes. Data collected in April, 1979.

greater access to computers for higher percentages of faculty than did either presidents/chancellors or academic vice presidents/deans. This result is consistent with earlier summaries of judgments regarding student access to computers by 1981-82. One third of responding heads of science departments judged that at least 81 percent of faculty in their departments by 1981-82 should have unlimited access to computers for administrative use in their classes or for instructional use in their classes. However, another third judged that none of the faculty in their departments by 1981-82 should have unlimited access to computers for these purposes.

As might be expected, all three types of respondent judged that higher percentages of teaching faculty than students should use computers in conjunction with their independent research by 1981-82. This conclusion may be substantiated by comparing the response distributions in Tables 136 through 138 with those in Tables 146 through 148. Just over 21 percent of presidents/chancellors judged that a majority of teaching faculty in their institutions by 1981-82 should use computers at any level in conjunction with their independent research. The corresponding percentage of academic vice presidents/deans expressing such judgments was 22. In contrast, 28 percent of heads of science departments suggested that a majority of teaching faculty in their departments by 1981-82 engage in substantial computer use in conjunction with their independent research (Table 148).

Finally, each type of respondent was asked to respond "yes" or "no" to the question "In your judgment, by 1981-82 should teaching faculty at your institution (in your department) have access to computers for unscheduled activities such as experimentation and games?". As with the parallel question concerned with access to computers for unscheduled activities by students enrolled by 1981-82, high percentages of all three types of respondent answered

Percent of Teaching Faculty	Level of Computing Use Desired for Faculty by 1981-82, in Conjunction with their Independent Research							
	No Use		Limited Use		Moderate Use		Substantial Use	
81 - 100	21	(22.3)	7	(7.4)	9	(9.6)	4	(4.3)
61 - 80	12	(12.8)	3	(3.2)	1	(1.1)	1	(1.1)
41 - 60	8	(8.5)	10	(10.5)	6	(6.4)	3	(3.2)
21 - 40	8	(8.5)	14	(14.7)	17	(18.1)	7	(7.4)
1 - 20	12	(12.8)	32	(33.7)	33	(35.1)	41	(43.6)
NONE	33	(35.1)	29	(30.5)	28	(29.8)	38	(40.4)

Table 146. Number and (percent) of 96 presidents or chancellors in minority higher education institutions indicating percent of teaching faculty in their institutions in 1981-82 who should use computers at various levels in conjunction with their independent research. Data collected in April, 1979.

Percent of Teaching Faculty	Level of Computing Use Desired for Faculty by 1981-82, in Conjunction with their Independent Research							
	No Use		Limited Use		Moderate Use		Substantial Use	
81 - 100	17	(20.5)	6	(7.3)	4	(4.9)	5	(6.1)
61 - 80	13	(15.7)	4	(4.9)	1	(1.2)	1	(1.2)
41 - 60	9	(10.8)	8	(9.8)	10	(12.2)	3	(3.7)
21 - 40	2	(2.4)	10	(12.2)	9	(11.0)	9	(11.0)
1 - 20	11	(13.3)	35	(42.7)	36	(43.9)	35	(42.7)
NONE	31	(37.3)	19	(23.2)	22	(26.8)	29	(35.4)

Table 147. Number and (percent) of 83 deans or academic vice presidents in minority higher education institutions indicating percent of teaching faculty in their institutions in 1981-82 who should use computers at various levels in conjunction with their independent research. Data collected in April, 1979.

Percent of Teaching Faculty	Level of Computing Use Desired for Faculty by 1981-82, in Conjunction with their Independent Research			
	No Use	Limited Use	Moderate Use	Substantial Use
81 - 100	26 (14.7)	17 (9.6)	14 (7.9)	30 (16.9)
61 - 80	13 (7.3)	4 (2.3)	11 (6.2)	2 (1.1)
41 - 60	11 (6.2)	13 (7.3)	21 (11.9)	17 (9.6)
21 - 40	7 (4.0)	31 (17.5)	21 (11.9)	23 (13.0)
1 - 20	19 (10.7)	30 (16.9)	26 (14.7)	25 (14.1)
NONE	101 (57.1)	82 (46.3)	84 (47.5)	80 (45.2)

Table 148. Number and (percent) of 178 heads of science departments in minority higher education institutions indicating percent of teaching faculty in their departments in 1981-82 who should use computers at various levels in conjunction with their independent research. Data collected in April, 1979.

affirmatively. According to responses shown in Table 149, over 82 percent of presidents/chancellors, more than three-fourths of academic vice presidents/ deans and nearly 90 percent of heads of academic departments would give future faculty access to computers for unscheduled activities. These percentages are somewhat higher than corresponding figures shown in Table 139 reflecting judgments on similar computer access for students.

D. Summary

The level of detail provided by the data presented in this section makes summarization very difficult. However, some emergent themes are apparent. Nearly all of the respondents suggest that academic computing should be a large part of their institutions' activities by 1981-82. There is no indication that these academic officers see their institutions' involvement in academic computing diminishing in the next two academic years, and in most cases, they see the level of academic computing increasing, both for students and faculty.

To accomplish this growth, directors of academic computing centers suggest the need for additional computer hardware and software. They want to increase the number and variety of computers presently available in their institutions for academic computing purposes, and achieve or maintain a broad mixture of central processing units, remote access devices, and personal computers. Additional input and output devices and card processing devices are specified for the short-term future as well. A large number of responding directors of academic computer centers indicated the need for additional compiler languages and additional packaged computer programs for statistical analysis of data files and file development and maintenance. The large number of "don't know" responses to questions on needed computer languages and packaged computer programs suggests the possibility of additional education of academic computing center directors in minority higher education institutions.

Response	Type of Respondent		
	President or Chancellor	Academic Vice President or Dean	Head of Science Department
Yes	79 (82.3)	63 (75.9)	158 (89.8)
No	17 (17.7)	20 (24.1)	18 (10.1)

Table 149. Number and (percent) of respondents in minority higher education institutions judging that, by 1981-82, teaching faculty at their institutions (or in their departments) should or should not have access to computers for unscheduled activities such as experimentation and games, by type of respondent. Data collected in April, 1979.

Large percentages of responding presidents/chancellors, academic vice presidents/deans and heads of science departments suggested that the faculty and students employed and enrolled in their institutions by 1981-82 should have access to computers for a variety of purposes, should be capable of using those computers if they are to succeed as students or as graduates, and should make use of those computers as a part of their independent research. Faculty involvement with computers was seen as somewhat more important than was student involvement. Use of computers for learning and teaching were seen as somewhat more important than was using computers in conjunction with independent research. Unscheduled use of computers for experimentation and games was seen as useful for future students and faculty by an overwhelming majority of all three types of academic officers.

IV. Efforts to Improve Academic Computing Capabilities

Section IV is a report on current and planned efforts to acquire or improve academic computer facilities and capabilities at responding minority higher education institutions. Data derived from questionnaires completed by presidents, academic vice-presidents/deans, heads of science departments, and academic computer directors pertain to: 1) the existence of campus-wide and/or departmental study groups on computing; 2) efforts of faculty to participate in academic computing conferences; 3) formulation of long range plans for academic computing services; and 4) efforts of the institution to engage in cooperative computing arrangements through networks or other linkages.

A. Existence of Study Groups

Eighty academic vice-presidents or deans responded to the question, "Have campus-wide planning groups met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes?". Fifty-two (62.7%) of the vice-presidents/deans reported that study groups had met, while 27 (32.5%) replied "no," such groups had not met. One dean did not know whether campus-wide groups at his institution had met for the purpose of discussing improvement of academic facilities and capabilities.

A question similar to the one above was asked of science department heads; one hundred and seventy-seven heads responded to a question about the existence of study groups on computing at the departmental level. One hundred and seven (60%) of the science department heads answered "yes" to the question and 59 (31.1%) science heads answered "no." Another ten (5.6%) did not know whether or not departmental groups had met. One department head stated that his institution had no reason to study the acquisition or improvement of computer facilities or capabilities because present facilities were excellent.

Percentages reported for existing departmental study groups were quite similar to percentages reported for the campus-wide study groups. See Table 150 for frequencies and percentages of both campus-wide study groups and departmental study groups at the various minority institutions.

B. Participation in Academic Computer Conferences

Academic vice-presidents/deans were aksed to identify those conferences which personnel from their institution attended for the purposes of updating or better informing themselves on instructional computing during the last five years. Conferences listed on the questionnaire were: ECMI (Educational Computing in Minority Institutions); CCUC (Conference on Computers in Undergraduate Curricula); AEDS (Association for Educational Data Systems); NAUCAL (National Association of Users of Computers Applied to Learning); and ADCIS (Association for Development of Computer-Based Instructional Systems). An "other" category also was included to accommodate conferences not specifically listed. A majority of the 80 responding academic vice presidents or deans indicated that personnel from their institutions had attended at least one of twelve different conferences in the last five years. The conferences most attended were those entitled Educational Computing in Minority Institutions. Forty-five vice-presidents or deans indicated that personnel from their institutions had attended ECMI. In comparison, fewer vice-presidents/deans reported personnel having attended the other listed conferences. Seventeen indicated "yes" beside CCUC; 11 answered "yes" to AEDS; 4 indicated personnel had attended the NAUCALconference; and 7 stated personnel had attended ADCIS. In the "other" category, seven conferences were written in: EDUCOM; Mathematical Association of America or American Mathematical Society meetings on instructional computing; IFIRS; ACM; GUOW; and NCHEMS. In each case, however, only one vice-president or dean indicated personnel from his/her particular institution had

	Campus-wide study groups have met		Departmental Study groups have met	
	N	%	N	%
Yes	52	62.7	107	60.1
No	27	32.5	59	33.1
Don't Know	1	1.5	10	5.6
Present Facilities Excellent	-	-	1	0.6
Missing	3	3.6	1	0.6

Table 150. Number and percent of campus-wide and departmental computer study groups having met, as reported by 85 academic vice-presidents/deans and 178 heads of science departments in minority higher education institutions.

attended the given conference. With the exception of the ECMI conference, the category most frequently checked for each of the listed conferences was "don't know." Table 151 gives a complete listing of the conferences identified on the questionnaire, and summarizes attendance data provided by the responding academic vice-presidents or deans.

C. Plans to Improve Computer Facilities and Capabilities

Two questions were asked of presidents with regard to longe range plans to improve computer facilities and capabilities at their institutions. The first question was general by design, and simply asked whether the institution had a long range plan for improvement of academic computing services. Of the 96 responding presidents, 61 stated "yes," their institution had long range plans. Thirty-four replied that their institutions did not have long range plans for computer improvement. One president indicated that such plans were currently being formulated (See Table 152). The frequencies and percentages shown for the existence of long range plans are quite similar to those reported in Table 151 for the number and percent of groups on campus created to study the acquisition or improvement of computer services. Nearly two-thirds of the institutions had long range plans and/or some type of study groups in existence.

As an extension of the first question, the second question directed to presidents asked about specific components of their institution's long range plans for meeting specific academic computing needs. The specific needs listed on the questionnaire were: hardware needs; academic software needs; computing personnel, computer facilities; and, training of faculty, staff, or students. An "other" category was also included to accommodate additional components not appearing on the list.

A majority of the 61 presidents who had acknowledged the existence of long range plans also checked "yes" beside each of the specific need categories

	Attendance		Nonattendance		Don't Know	
	N	%	N	%	N	%
Conferences						
ECMI	45	56.3*	18	22.5	17	21.3
CCUC	17	21.3	29	36.3	34	42.5
AEDS	11	13.8	30	37.5	39	48.8
NAUCAL	4	5.0	35	43.8	41	51.3
ADCIS	7	8.8	33	41.3	40	50.0
Other:						
EDUCOM	1	1.2	-	-	1	1.2
MAA OR AMS meetings on Comp. Inst.	1	1.2	-	-	-	-
IFIRS	2	2.4	-	-	-	-
ACM	1	1.2	-	-	-	-
GUOW	1	1.2	-	-	-	-
NCHEMS	1	1.2	-	-	-	-

Table 151. Number and percent of institutions with personnel attending academic computing conferences during the last five years, as reported by 83 academic vice presidents or deans in minority higher education institutions.

* Percentages for all conferences not in the "other" category are adjusted for three missing responses.

listed on the questionnaire. The most frequently checked item was training of faculty, staff or students; fifty-eight of the 61 presidents (95%) indicated training was part of their institution's long range computer plans. Fifty-six presidents (92% of the 61) checked "yes" beside the computer hardware (machines) item. Fifty-five presidents (90% of the 61) indicated that academic software needs were part of their institution's long range plans. Computer personnel were considered in the long range plans of 52 institutions (85% of the 61 responding presidents checked it), and 45 presidents (73% of the 61) placed a check mark beside computer facilities (space). In the "other" need category, two presidents stated that training of administrators was included in their institution's long range plans. Again, refer to Table 152.

D. Investigation of Alternative Arrangements

Directors of academic computer centers responded to a series of questions pertaining to alternative arrangements for computing in their institutions. The questions sought information about the use of networks, leasing computers, ownership of computers for academic purposes, contracts with commercial data processing companies, and/or the use of computer facilities at some other non-commercial institutions. The questionnaires included a pair of questions for each of the above-mentioned alternative arrangements. The first question asked computer center directors about his/her institution's current position with respect to a specific alternative arrangement, and the second asked whether the possibility of such arrangements had been formally investigated. If a computer center director answered "yes" to the first question, (s)he was not likely to respond to the second question at all (See Table 153).

In response to a question about current participation in computing networks, 20 directors answered "yes" and 33 answered "no." As to the possibility of the director's institution joining an academic computing network, 17 indicated

	Yes		No		Missing	
	N	%	N	%	N	%
Have a long range plan for academic computing.*	61	63.5	34	35.4	-	
Plan considers hardware needs	56	58.3**	5	5.2	35	36.5
Plan considers software needs	55	57.3	6	6.3	35	36.5
Plan considers computing personnel	52	54.2	9	9.4	35	36.5
Plan considers computer facilities	45	46.9	14	14.6	37	38.5
Plan considers training needs	58	60.4	3	3.1	35	36.5
Plan considers other factors:						
Training Administrators	2	2.1	4	4.2	90	93.8

Table 152. Number and percent of institutions having long range plans for improvement of academic computing, and specific components of those plans, as reported by 96 presidents of minority higher education institutions.

* One president indicated long range plans currently being formulated.

** Percentages are based on total of 96 responding presidents.

that such arrangements had been formally investigated and twenty-two directors did not respond to the question. Only 11 of the 55 responding computer center directors stated that their institutions currently leased a computer for academic purposes. To the question of formally investigating the possibility of leasing a computer, 18 directors answered "yes," 20 answered "no," and 17 did not respond.

Over half of the responding computer center directors (30 of 55) indicated that their institutions owned a computer for academic purposes. Of the remaining 25 directors, 23 checked "no," indicating that their institutions did not own a computer for academic purposes. To the question, "Has your institution formally investigated the possibility of purchasing a computer to be used for academic purposes?", 11 directors replied "yes," and 10 answered "no." The other 34 directors did not reply.

According to responding computer center directors, only one institution contracted with a commercial data processing company to secure academic computing services. When asked whether the possibility of such a contract arrangement had been formally pursued, 11 directors replied "yes" and 36 replied "no." As for the use of computer facilities at some other non-commercial institution, for example, another higher education institution or government agency, 25 of the directors stated that their institutions currently did so, and 30 indicated that their institutions did not. Of the 30 who stated that their institution did not use any other non-commercial institution's computing facilities, six indicated that their institution had investigated the possibility. The other 24 stated that non-commercial arrangements had not been formally investigated.

The final two questions on alternative arrangements for academic computing services asked the participating directors whether other efforts to secure

	Institution Currently Participated in Arrangement						Institution Has Investigated Arrangement					
	Yes	%	No	%	Did Not Reply	%	Yes	%	No	%	Did Not Reply	%
Uses an Academic Computer Network	20	36.4*	33	60.0	2	3.6	17	30.9	16	29.6	22	40.0
Leases a Computer	11	20.0	42	76.4	2	3.6	18	32.7	20	36.4	17	30.9
Owns a Computer	30	54.5	23	41.8	2	3.6	11	20.8	10	18.2	34	61.8
Contracts with Commercial Data Processing Companies	1	1.8	52	94.5	2	3.6	11	20.0	36	65.5	8	14.5
Uses Computer Facilities of Another non-Commercial Institution	25	45.5	30	54.5	0	0.0	6	10.9	24	43.6	25	45.5
Other Arrangements	11	20.0	42	76.4	2	3.6	7	12.7	0	0.0	48	87.3

Table 153. Number and percent of institutions engaging in various alternative arrangements for academic computer services, as reported by 55 directors of academic computing centers in minority higher education institutions.

* Percentages are based on total of 55 responding directors of academic computing centers.

computing services, besides those listed on the questionnaire, had been considered. Only 11 of the 53 directors stated that other arrangements had been investigated. Additional arrangements listed by one or more computing center directors included: use of Title III (federal) funds to purchase micro-computers; purchase of Radio Shack micro computers; use of private grants for purchase of small computers; and use of donations from private industry for purchase of hardware.

E. Summary

In two-thirds of the responding institutions, as reported by 83 academic vice presidents/deans and 178 heads of science departments, campus-wide and science-department groups have met on campus for the purpose of studying the acquisition and/or improvement of academic computing services. Likewise, according to responding academic vice presidents or deans, two-thirds of the institutions have had personnel attend relevant conferences in the last five years in order to update or better inform themselves on instructional computing. The conferences most frequently attended were those entitled ECMI (Educational Computing in Minority Institutions). Sixty-one of the 96 responding presidents of minority institutions stated that their institutions have long range plans for improving present computing facilities and capabilities. The vast majority of institutional long range plans were reported to include provisions for the acquisition or improvement of hardware, software, computing personnel, facilities, and personnel training. From information on alternative academic computing arrangements, supplied by 55 academic computer center directors, it appears that only one-third of the institutions currently participate in an academic computer network; one-fourth of the institutions now lease a computer; less than half of the institutions use the computer facilities of some non-commercial institution; and, only 11 of 55 institutions (20%) have investigated other arrangements such as securing private grants. Even fewer institutions than are currently using the above mentioned alternative computing arrangements have investigated the possibility of developing such arrangements.

V. Perceived Problems in Developing Improved Academic Computing Capabilities

Presidents or chancellors and directors of academic computing centers were asked to identify which, if any, constraints, pressures and forces hampered the development of academic computing programs at their institutions.

Fifty-seven percent of presidents or chancellors reported that some agencies or forces external to their institutions hampered the development of academic computing programs at their institutions. The federal government and state governments were noted as sources of restrictions that hamper development of academic computing by about one-fourth of the presidents or chancellors. This number represents about half of those presidents or chancellors who reported that external forces or agencies hampered development of their computing programs. Local governments were reported to hamper the development of academic computing programs by nine percent of responding presidents or chancellors. Twenty-three percent reported additional sources of restrictions on development of academic computing. (See Table 154.)

The federal government was reported to hamper development of academic computing programs in various ways. (See Table 155.) About one-fourth of 96 presidents or chancellors indicated that the federal government placed restrictions on the use of federal funds for the purchase of computing hardware, to the extent that those restrictions were noted as hampering development of academic computing programs. Fifteen percent of responding presidents or chancellors reported that restrictions on the use of federal funds for rental of computing hardware hampered development of academic computing programs at their institutions. Both unnecessary bureaucratic red tape and regulations and the lack of federal funds for personnel were cited by sixteen percent of responding presidents or chancellors as factors which hampered development of academic computing programs at their institutions. Technical restrictions,

Agency or Force which Hampers Development of Academic Computing Programs	Number and (percent) of Presidents or Chancellors Reporting that Various Agencies or Forces Hamper Development of Academic Computing Programs at their Institutions	
Forces or Agencies External to the Institution	55	(57)
Federal Government	23	(24)
State Governments	23	(24)
Local Governments	9	(9)
Other Forces (Internal and External to the Institution)	22	(23)

Table 154. Number and (percent) of 96 presidents or chancellors of minority higher education institutions reporting that various forces or agencies hamper development of academic computing programs at their institutions. Data collected April, 1979.

Ways in which Federal Government Hampers Development of Academic Computing Programs	Number and (percent) of Presidents or Chancellors Reporting that the Federal Government Hampers Development of Academic Computing Programs at their Institutions in Various Ways
Restrictions on Purchase of Computing Hardware	23 (24)
Restrictions on Rental of Computing Hardware	14 (15)
Providing no Funds for Personnel	15 (16)
Unnecessary Bureaucratic Red Tape and Regulations	15 (16)
Technical Restrictions	5 (5)
Restrictions on Purchases for Laboratories	1 (1)
Absence of Targeted Programs	1 (1)
Other Ways, Not Specified	3 (3)

Table 155. Number and (percent) of 96 presidents or chancellors of minority higher education institutions reporting the various ways in which the federal government hampers development of academic computing programs at their institutions. Data collected April, 1979.

not further identified, were cited by five percent of responding presidents or chancellors. One president or chancellor listed restrictions on purchases of computing equipment for laboratories and one president or chancellor listed the absence of targeted programs as ways in which the federal government hampered development of academic computing programs at their institutions. Three presidents or chancellors noted that the federal government hampers development of academic computing programs at their institutions in yet other ways, but did not specify the restrictions that concerned them.

State governments were reported to hamper the development of academic computing programs by about one-fourth of responding presidents or chancellors. Five categories of hampering restrictions or limitations imposed by state governments were noted by responding presidents or chancellors. (These are listed in Table 156.) Fifteen percent of responding presidents or chancellors indicated that state restrictions on the purchase of computing hardware hampered the development of academic computing programs at their institutions. Sixteen percent cited adverse political decisions. Two presidents or chancellors reported "irresponsibility." Budget limitatations were cited by five percent of responding presidents or chancellors, and funding regulations were cited by two percent.

Local governments were cited as the source of hindrances to academic computing development by nine percent of 96 presidents or chancellors. Low awareness by local government was cited by nine percent of the respondents. Two presidents or chancellors indicated that local government budget limitations hampered development of academic computing programs at their institutions. Additional local government limitations or restrictions which hampered development of academic computing programs were cost restrictions, local political problems, bureaucracy, restrictions on purchase of computing hardware,

Ways in which State Government Hampers Development of Academic Computing Programs	Number and (percent) of Presidents or Chancellors Reporting that their State Government Hampers Development of Academic Computing Programs at their Institutions in Various Ways
Restrictions on Purchase of Computing Hardware	14 (15)
Adverse Political Decisions	15 (16)
Irresponsibility	2 (2)
Budget Limitations	5 (5)
Funding Regulations	2 (2)

Table 156. Number and (percent) or 96 presidents or chancellors in minority higher education institutions reporting the various ways in which their state government hampers development of academic computing programs at their institutions. Data Collected April, 1979.

Ways in which Local Government Hampers Development of Academic Computing Programs	Number and (percent) of Presidents or Chancellors Reporting that Local Government Hampers Development of Academic Computing at their Institutions in Various Ways
Low Awareness	9 (9)
Cost Restrictions	1 (1)
Local Political Problems	1 (1)
Bureaucracy	1 (1)
Restrictions on Purchase of Computing Hardware	1 (1)
Requirements for Budget Approval	1 (1)
Budget Limitations	2 (2)
Other Local Government Restrictions (not specified)	1 (1)

Table 157. Number and (percent) of 96 presidents or chancellors of minority higher education institutions reporting the various ways in which local government hampers development of academic computing programs at their institutions. Data collected April, 1979.

requirements for budget approval, and other restrictions, each cited by one president or chancellor. (See Table 157.)

Additional factors which were reported to hamper development of academic computing programs are listed in Table 158. Eight percent of responding presidents or chancellors cited lack of funds. Two percent of presidents or chancellors listed inadequate preparation of students. A large number of other factors which hamper development of academic computing programs were listed by one president or chancellor each. These factors included: government red tape, small size of institution, socio-political problems, private competition, limitations on budget for personnel and equipment, distance from computer, repair problems, computer network regulations, central state system, lack of trained faculty, state regulations, and cultural forces.

Regulations and red tape were most often cited by presidents or chancellors as factors imposed by local, state and federal governments as hampering the development of academic computing programs. Budget limitations were cited by five percent of responding presidents or chancellors as being a problem at the state level, and by two percent as being a problem at the local level. No president or chancellor reported specifically that lack of federal funds presented development problems, but rather that problems stemmed from restrictions on the use of those funds. Whether restrictions on use of federal funds were cited because the scarcity of such funds intensifies the awareness of those restrictions, or whether the restrictions and the attendant paperwork are in fact the problem hampering development of academic computing programs, cannot be determined from the data at hand. Fourteen different categories of government restrictions and regulations (federal, state and local) are indicated as hampering development of computing programs at minority institutions.

Sources of Restrictions which Hamper Development of Academic Computing Programs	Number and (percent) of Presidents or Chancellors Reporting Restrictions from Various Sources Which Hamper Development of Academic Computing Programs	
Lack of Funds	8	(8)
Government Red Tape	1	(1)
Small Size of Institution	1	(1)
Socio-Political Problems	1	(1)
Private Competition	1	(1)
Limitations on Budget for Personnel and Equipment	1	(1)
Inadequate Preparation of Students	2	(2)
Distance from Computer	1	(1)
Repair Problems	1	(1)
Computer Network Regulations	1	(1)
Central State System	1	(1)
Lack of Trained Faculty	1	(1)
State Regulations	1	(1)
Cultural Forces	1	(1)

Table 158. Number and (percent) of 96 presidents or chancellors of minority higher education institutions reporting various sources of restrictions which hamper development of academic computing programs at their institutions. Data collected April, 1979.

Directors of academic computing centers were asked to rate the severity with which various factors hamper development of academic computing programs at their institutions. They were asked to rate each factor on a five-point scale ranging from "no problem" to "extremely severe problem." (See Table 159.)

Almost three-fourths of the responding computing center directors cited budget limitations as being a major problem or an extremely severe problem. This is consistent with information presented in Section II of this report, covering the expenditure of funds for various categories of academic computing resources. With the exception of a few institutions, the amounts spent in every category were very small. Twelve percent of responding directors of academic computing centers indicated that budget limitations presented either no problem or a minor problem in the development of academic computing programs. Sixteen percent noted budget limitations as an occasional problem.

Lack of professional computer personnel was noted as a major problem or an extremely severe problem by 42 percent of responding computing center directors. One-fourth of the computing center directors indicated that lack of professional computer personnel was an extremely severe problem. These responses can be compared with information presented in Table 63 of Section II of this paper, from which it can be seen that the number of professional computer personnel employed is relatively low at the majority of responding institutions. Lack of professional computer personnel is noted as an occasional problem by an additional 29 percent of responding academic computing center directors. Twenty-nine percent of academic computing center directors indicated that lack of professional computer personnel presented either a minor problem or no problem.

The level of expertise of available computer personnel was reported to be no problem or a minor problem by just under half of the responding directors

Number and (Percent) of Directors of Academic Computing Centers Reporting Seriousness of Effects of Various Factors on Development of Academic Computing Programs

Factor which Adversely Affects Development of Academic Computing Program	Number and (percent) of Directors of Academic Computing Centers Reporting each Category of Response				
	No Problem	No Problem	Occasional Problem	Major Problem	Extremely Severe Problem
Budget Limitations	3 (6)	3 (6)	9 (16)	19 (35)	21 (38)
Lack of Professional Computer Personnel	6 (11)	10 (18)	16 (29)	9 (16)	14 (26)
Level of Expertise of Available Personnel	14 (26)	12 (22)	13 (24)	11 (20)	4 (7)
Level of Expertise among Potential Computer Users	6 (11)	9 (16)	17 (31)	13 (25)	8 (15)
Institutional Budget Priorities	3 (6)	7 (13)	12 (22)	15 (27)	18 (33)
Space of Facilities Limitations	14 (26)	18 (33)	6 (11)	12 (22)	5 (9)
Lack of Computer Hardware	10 (18)	7 (13)	16 (30)	15 (27)	7 (13)
Lack of Computer Software or Appropriate Courseware	11 (20)	14 (26)	12 (22)	15 (27)	3 (6)
Lack of Interest in Academic Computing by Administration	14 (26)	14 (26)	13 (24)	8 (15)	5 (9)
Lack of Interest in Academic Computing by Faculty	11 (20)	16 (30)	9 (16)	13 (24)	6 (11)
Lack of Computer Literacy Among Faculty or Students	1 (2)	1 (2)		1 (2)	
Lack of State Budget Support					2 (4)

Table 159. Number and (percent) of 55 directors of academic computing centers at minority higher education institutions reporting the seriousness with which various factors affect the development of academic computing programs at their institutions. Data collected April, 1979.

of academic computing centers. An additional twenty-four percent indicated that the level of expertise of available personnel presented occasional problems. Twenty-seven percent reported that it was a major problem or an extremely severe problem. The smallest number of responses to the question about the difficulty presented by the level of expertise of available computer personnel were from the seven percent of academic computing center directors who reported this to be an extremely severe problem.

The level of expertise among potential computer users was reported to be a major problem or an extremely severe problem hampering the development of an academic computing program by forty percent of responding academic computing center directors. An additional thirty-one percent reported it to be an occasional problem. The level of expertise of potential computer users was reported to be either no problem or a minor problem by about one-fourth of responding academic computing center directors.

Sixty percent of responding academic computing center directors cited institutional budget priorities as either a major problem or an extremely severe problem in development of academic computing programs at their institutions. One-third of academic computing center directors cited institutional budget priorities as an extremely severe problem. Fewer than one-fifth rated institutional budget priorities as either no problem or a minor problem, and just over one-fifth rated budget priorities as an occasional problem.

Space of facilities limitations were reported to present no problem or a minor problem by fifty-nine percent of responding academic computing directors. Thirty-one percent reported space or facilities limitations to be a major problem or an extremely severe problem.

Forty percent of responding academic computing center directors reported that lack of computer hardware was either a major problem or an extremely severe problem, and an additional 30 percent indicated that it was an occasional problem. About thirty percent of academic computing center directors noted that lack of computer hardware was either no problem or a minor problem.

Lack of computer software or appropriate courseware was reported to be an extremely severe problem by only six percent of responding academic computing center directors. About half the computing center directors indicated that lack of computer software or courseware presented occasional problems or a major problem. It was reported to be a minor problem by about one-fourth the computing center directors, and no problem by about one-fifth.

Lack of interest in academic computing by administration was reported to be either no problem or a minor problem by over one-half of the responding computing center directors. An additional one-fourth noted that lack of interest in academic computing by the administration presented an occasional problem. This factor was reported to be a major problem or an extremely severe problem by about one-fourth of the responding directors. That lack of interest in academic computing by the administration was reported to be no problem, a minor problem or just an occasional problem by about three-fourths of academic computing center directors is consistent with information presented in Tables 103 through 107 of Section II of this report. Those tables and the accompanying discussion show that a very large majority of presidents or chancellors and deans or academic vice-presidents were in agreement with statements that academic computing programs benefit students and faculty at their institutions.

Lack of interest in academic computing by faculty was reported to be a minor problem or no problem by about one-half of the responding academic computing center directors. Just over one-third reported it to be a major problem or an extremely severe problem, and sixteen percent indicated that it was an occasional problem.

Lack of computer literacy was reported to be a major problem by one director of academic computing, a minor problem by one, and no problem by one. Two directors of academic computing centers rated the lack of state budget support as an extremely severe problem which hampered development of academic computing programs at their institutions.

VI. The Relationship Between Education in the Sciences and Current Academic Computing Status

Does investment in academic computing foster the growth of an institution's program of education in the sciences? Does the growth of an institution's program of education in the sciences lead to pressure for investment in academic computing? Will institutions with large and productive education programs in the sciences naturally invest more in academic computing because of some other factor? Unfortunately, the data available from this survey — or from any survey for that matter — do not provide a basis for inferring cause, nor for teasing out the direction of a causal relationship between education in the sciences and level of investment in academic computing, should such a causal relationship exist. However, data from this survey can be used to search for relationships between education in the sciences and institutional investment and activity in academic computing, and to explore the strength of those relationships. Such a search is the subject of this section.

Academic vice presidents and deans in 83 minority higher education institutions responded to a number of questions on education in the sciences in their institutions. These questions have been grouped into four categories: 1) the existence and size of science programs, as defined by course offerings and student enrollments; 2) the size of science programs as defined by numbers of science faculty employed; 3) the level of science programs offered, as defined by types of science degrees offered; and 4) the productivity of science programs, as defined by the number of science degrees awarded over the five-year period 1974-79, by level of degree. In addition, these academic vice presidents and 178 heads of science departments in minority higher education institutions provided a wealth of information on the availability of academic computing to students and faculty in their institutions and departments, and on the computing skills and activities of their students and faculty. The questions they answered on academic computing have also been grouped into four categories: 1) the accessibility of computers to students and faculty for academic uses; 2) the levels of computing skills of students and faculty in the sciences; 3) the levels of computing activity of faculty in the sciences, by type of activity; and 4) the engagement of institutional officers in studies to improve the computing capabilities of the institution.

To explore the existence and strength of relationships between education in the sciences and academic computing in minority higher education institutions, we have examined the relationships between variables enerated from each of the four categories of questions on education in the sciences together with variables generated from each of the four categories of questions on academic computing. The resulting sixteen sets of relational analyses are considered in order. A final subsection provides a short summary of findings across the sixteen sets of analyses.

A. Relationships Between Courses and Students in the Sciences, and Access to Academic Computing

Four variables were used to define the size of academic programs in the sciences in terms of numbers of students and courses. Eighty-three academic vice presidents or deans in minority higher education institutions responded to questions on the offering of courses in the sciences, the number of different science courses offered at their institutions during the 1978-79 academic year, the number of students enrolled as science majors in their institutions, and the total current enrollment of students in science classes offered by their institutions. These indices of the size of institutions' science programs were related to the responses of these academic vice presidents or deans, and the responses of 178 heads of science departments, to six questions on the accessibility of computers to faculty and students in their institutions and departments. Vice presidents or deans reported in the accessibility of a computer to the institution and whether or not their institution had a computer located on campus. Science department heads reported on the accessibility of computers to science faculty and students collectively, and more specifically, to science faculty, to undergraduate students in the sciences, and to graduate students in the sciences. Relationships between these sets of variables are summarized in Tables 160 through 184.

Tables 160 through 163 provide a basis for analyzing relationships between institutional offerings and enrollments in the sciences, and the accessibility of a computer to the institution. Since almost all (98 percent) of responding vice presidents/deans reported that their institutions offer science courses, this variable cannot be strongly related to any other variable. The slight apparent relationship between offering of science courses and institutional access to a computer (Table 160) becomes virtually meaningless once absolute sample sizes are considered (Only two responding vice presidents/deans reported that their institutions did not offer science courses.). From Table 161 we see that the proportion of institutions with reported access to a computer increases markedly as a function of the number of different science courses offered. Above "11 or more science courses offered," the functional relationship becomes nearly flat, however. The contingency coefficient associated with the data in Table 161 is 0.42, suggesting a moderate relationship between the two variables. The relationship between total current enrollment in science courses and reported institutional access to a computer (Table 162) is very similar to that shown in Table 161. The relationship between the variables might be described as moderate to strong (contingency coefficient of 0.44),

```
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M                21:36 WEDNE

                    TABLE OF SCICOUR BY INACOMP

         SCICOUR   ARE ANY SCIENCE COURSES OFFERED   INACOMP   DOES INSTI

         FREQUENCY|   Institution Has Access to a Computer
         PERCENT  |
         ROW PCT  |
         COL PCT  |  .     |YES     |NO      |  TOTAL
         ---------+--------+--------+--------+
            .     |      0 |      1 |      0 |      .
                  |      . |      . |      . |      .
                  |      . |      . |      . |
                  |      . |      . |      . |
         ---------+--------+--------+--------+
         YES      |      1 |     68 |     11 |     79
                  |      . |  83,95 |  13,58 |  97,53
                  |      . |  86,08 |  13,92 |
                  |      . |  98,55 |  91,67 |
         ---------+--------+--------+--------+
         NC       |      0 |      1 |      1 |      2
                  |      . |   1,23 |   1,23 |   2,47
                  |      . |  50.00 |  50.00 |
                  |      . |   1.45 |   8.33 |
         ---------+--------+--------+--------+
         TOTAL           .       69       12       81
                         .    85,19    14,81   100,00
```

Institution Offers Science

Table 160. Number and percent of institutions offering science courses, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF DSC78 BY INACOMP

DSC78     N DIFFERENT SCIENCE COURSES 78-79   INACOMP   DOES INS
```

Institution Has Access to a Computer

Number of Different Science Courses Offered 1978-79

```
FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
       .  |       0|       5|       1|       .
          |       .|       .|       .|       .
          |       .|       .|       .|
          |       .|       .|       .|
---------+--------+--------+--------+
0-5       |       0|       5|       4|       9
          |       .|    6.58|    5.26|   11.84
          |       .|   55.56|   44.44|
          |       .|    7.69|   36.36|
---------+--------+--------+--------+
6-10      |       0|       7|       4|      11
          |       .|    9.21|    5.26|   14.47
          |       .|   63.64|   36.36|
          |       .|   10.77|   36.36|
---------+--------+--------+--------+
11-20     |       1|       8|       1|       9
          |       .|   10.53|    1.32|   11.84
          |       .|   88.89|   11.11|
          |       .|   12.31|    9.09|
---------+--------+--------+--------+
21-30     |       0|      11|       2|      13
          |       .|   14.47|    2.63|   17.11
          |       .|   84.62|   15.38|
          |       .|   16.92|   18.18|
---------+--------+--------+--------+
>30       |       0|      34|       0|      34
          |       .|   44.74|    0.00|   44.74
          |       .|  100.00|    0.00|
          |       .|   52.31|    0.00|
---------+--------+--------+--------+
TOTAL             .       65       11       76
                  .    85.53    14.47   100.00
```

Table 161. Number and percent of institutions offering different science courses by number, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M                21:36 WED
                                                     -242-
                 TABLE OF SCIENR BY INACOMP

SCIENR     TOTAL SCIENCE CLASSES ENROLLMENT     INACOMP     DOES INS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |  .      |YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |       0 |       4 |       1 |       .
         |       . |       . |       . |       .
         |       . |       . |       . |
         |       . |       . |       . |
---------+--------+--------+--------+
0-50     |       0 |       4 |       3 |       7
         |       . |    5.19 |    3.90 |    9.09
         |       . |   57.14 |   42.86 |
         |       . |    6.06 |   27.27 |
---------+--------+--------+--------+
51-100   |       1 |       5 |       3 |       8
         |       . |    6.49 |    3.90 |   10.39
         |       . |   62.50 |   37.50 |
         |       . |    7.58 |   27.27 |
---------+--------+--------+--------+
101-250  |       0 |       8 |       4 |      12
         |       . |   10.39 |    5.19 |   15.58
         |       . |   66.67 |   33.33 |
         |       . |   12.12 |   36.36 |
---------+--------+--------+--------+
251-500  |       0 |       8 |       1 |       9
         |       . |   10.39 |    1.30 |   11.69
         |       . |   88.89 |   11.11 |
         |       . |   12.12 |    9.09 |
---------+--------+--------+--------+
501-1000 |       0 |      13 |       0 |      13
         |       . |   16.88 |    0.00 |   16.88
         |       . |  100.00 |    0.00 |
         |       . |   19.70 |    0.00 |
---------+--------+--------+--------+
>1000    |       0 |      28 |       0 |      28
         |       . |   36.36 |    0.00 |   36.36
         |       . |  100.00 |    0.00 |
         |       . |   42.42 |    0.00 |
---------+--------+--------+--------+
TOTAL            .        66        11        77
                 .     85.71     14.29    100.00
```

Institution Has Access to a Computer

Total Current Enrollment in Science Courses

Table 162. Number and percent of institutions having various total enrollments in science courses, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

with a flattening of the function once a science enrollment of at least 251 students is reached. Finally, number of enrolled science majors is related to institutional access to a computer (Table 163) to virtually the same degree as is total enrollment in science courses. Every institution for which the number of science majors exceeded 100 students was reported to have access to a computer. The contingency coefficient associated with these variables was 0.44.

Although an institution has access to a computer, it may not be the case that students and faculty in the sciences have access to the computer for academic purposes. Furthermore, relationships between this latter variable and indicators of the size of academic science programs may differ from those between institutional access to a computer and such indicators. Tables 164 through 167 contain crosstabulations of responses to questions on offerings and enrollments in the sciences, and whether or not students and faculty in the sciences have access to a computer for academic purposes. Since almost all institutions for which responses were received offer courses in the sciences, the relationship between faculty and student access to a computer and offering of science courses, illustrated in Table 164, is equivocal and should be discounted. As shown by the data in Table 165, the relationship between number of different science courses offered and access to a computer by science students and faculty is quite strong, and is continuously increasing provided at least six different science courses are offered. If data from institutions with responding academic officers are generalized to the entire population of minority higher education institutions, the chi-square statistic of 41.1 (p 6.0001) associated with this table is worth noting. In any case, these variables had an associated contingency coefficient of 0.51. Although there is some tendency for the proportion of institutions in which science faculty or students have access to a computer to increase as total enrollment

```
                   TABLE OF ENRMAJ BY INACOMP

ENRMAJ     NUMBER SCIENCE MAJORS ENROLLED     INACOMP    DOES INSTITL

FREQUENCY|  Institution Has Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |  .      |YES     |NO      |  TOTAL
---------+---------+--------+--------+
       . |       0 |      4 |      1 |      .
         |       . |      . |      . |      .
         |       . |      . |      . |
         |       . |      . |        |
---------+---------+--------+--------+
0-50     |       1 |     15 |      9 |     24
         |       . |  19.48 |  11.69 |  31.17
         |       . |  62.50 |  37.50 |
         |       . |  22.73 |  81.82 |
---------+---------+--------+--------+
51-100   |       0 |      7 |      2 |      9
         |       . |   9.09 |   2.60 |  11.69
         |       . |  77.78 |  22.22 |
         |       . |  10.61 |  18.18 |
---------+---------+--------+--------+
101-250  |       0 |     12 |      0 |     12
         |       . |  15.58 |   0.00 |  15.58
         |       . | 100.00 |   0.00 |
         |       . |  18.18 |   0.00 |
---------+---------+--------+--------+
251-500  |       0 |     18 |      0 |     18
         |       . |  23.38 |   0.00 |  23.38
         |       . | 100.00 |   0.00 |
         |       . |  27.27 |   0.00 |
---------+---------+--------+--------+
501-1000 |       0 |      6 |      0 |      6
         |       . |   7.79 |   0.00 |   7.79
         |       . | 100.00 |   0.00 |
         |       . |   9.09 |   0.00 |
---------+---------+--------+--------+
>1000    |       0 |      8 |      0 |      8
         |       . |  10.39 |   0.00 |  10.39
         |       . | 100.00 |   0.00 |
         |       . |  12.12 |   0.00 |
---------+---------+--------+--------+
TOTAL            .       66       11       77
                 .    85.71    14.29   100.00
```

Number of Enrolled Science Majors

Table 163. Number and percent of institutions having various total numbers of science majors, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF SCICOUR BY COMPAC

     SCICOUR   ARE ANY SCIENCE COURSES OFFERED   COMPAC    FACULTY-S

     FREQUENCY|    Science Faculty or Students
     PERCENT  |    Have Access to a Computer
     ROW PCT  |
     COL PCT  |    .    |YES     |NO      |  TOTAL
     ---------+--------+--------+--------+
         .    |      0 |     34 |     17 |      .
              |      . |      . |      . |      .
              |      . |      . |      . |
              |      . |      . |      . |
     ---------+--------+--------+--------+
     YES      |     25 |     96 |     29 |    125
              |      . |  75.59 |  22.83 |  98.43
              |      . |  76.80 |  23.20 |
              |      . |  98.97 |  96.67 |
     ---------+--------+--------+--------+
     NO       |      0 |      1 |      1 |      2
              |      . |   0.79 |   0.79 |   1.57
              |      . |  50.00 |  50.00 |
              |      . |   1.03 |   3.33 |
     ---------+--------+--------+--------+
     TOTAL           .       97       30      127
                     .    76.38    23.62   100.00
```

Institution Offers Science Courses

Table 164. Number and percent of institutions offering science courses, by institutions providing access to a computer for science faculty or students, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                     TABLE OF DSC78 BY COMPAC

DSC78     N DIFFERENT SCIENCE COURSES 78-79   COMPAC    FACULTY·

                     Science Faculty or Students
FREQUENCY|           Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |  .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
   .     |      1 |     39 |     19 |     .
         |      . |      . |      . |     .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-5      |      6 |      3 |      4 |      7
         |      . |   2.50 |   3.33 |   5.83
         |      . |  42.86 |  57.14 |
         |      . |   3.26 |  14.29 |
---------+--------+--------+--------+
6-10     |      4 |      3 |      8 |     11
         |      . |   2.50 |   6.67 |   9.17
         |      . |  27.27 |  72.73 |
         |      . |   3.26 |  28.57 |
---------+--------+--------+--------+
11-20    |      1 |      7 |      8 |     15
         |      . |   5.83 |   6.67 |  12.50
         |      . |  46.67 |  53.33 |
         |      . |   7.61 |  28.57 |
---------+--------+--------+--------+
21-30    |      5 |     13 |      5 |     18
         |      . |  10.83 |   4.17 |  15.00
         |      . |  72.22 |  27.78 |
         |      . |  14.13 |  17.86 |
---------+--------+--------+--------+
>30      |      8 |     66 |      3 |     69
         |      . |  55.00 |   2.50 |  57.50
         |      . |  95.65 |   4.35 |
         |      . |  71.74 |  10.71 |
---------+--------+--------+--------+
TOTAL           .       92       28      120
                .    76.67    23.33   100.00
```

Number of Different Science Courses Offered 1978-79

Table 165. Number and percent of institutions offering different science courses by number, by institutions providing access to a computer for science faculty or students, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

in science courses increases (Table 166), the relationship is neither monotonic nor strong. The contingency coefficient associated with these data equals 0.392, probably reflecting the degree of access to a computer provided science students and faculty in institutions with science enrollments of 250 or less, as contrasted with the access provided those in institutions with science enrollments of 251 or more. There appears to be a definite relationship between the number of enrolled science majors in an institution and the probability that science students and faculty in that institution will have access to a computer (Table 167). For institutions with more than 100 reported science majors, the probability of science students and faculty having access to a computer is quite high, whereas it is substantially lower in institutions with less than 100 science majors (See Table 167). The contingency coefficient associated with these data is 0.437.

The relationships suggested by the data shown in Tables 168 through 171 can be summarized as follows: Whether or not undergraduate students in science departments have access to computer facilities appears to be 1) virtually unrelated to whether or not an institution offers science courses (because so few institutions in the sample were reported to not offer science courses — Table 168); 2) moderately related to the number of different science courses an institution offers (The data in Table 169 have an associated contingency coefficient of 0.35.); 3) essentially unrelated to the institution's current total enrollment in science courses (See Table 170, and note that the contingency coefficient for these variables is only 0.18.); and 4) moderately related to the number of enrolled science majors in the institution. On the last point, the data shown in Table 171 suggest that almost all institutions with more than 50 enrolled science majors provide science undergraduates with access to computing facilities. The contingency coefficient associated with

```
                       TABLE OF SCIENR BY COMPAC

     SCIENR    TOTAL SCIENCE CLASSES ENROLLMENT   COMPAC     FACULTY-S

                        Science Faculty or Students
     FREQUENCY|         Have Access to a Computer
     PERCENT  |
     ROW PCT  |
     COL PCT  |  .      |YES     |NO      |  TOTAL
     ---------+--------+--------+--------+
            . |       1 |      38 |      19 |      .
              |       . |       . |       . |      .
              |       . |       . |       . |
              |       . |       . |       . |
     ---------+--------+--------+--------+
     0-50     |       2 |       2 |       4 |      6
              |       . |    1.65 |    3.31 |   4.96
              |       . |   33.33 |   66.67 |
              |       . |    2.15 |   14.29 |
     ---------+--------+--------+--------+
     51-100   |       4 |       7 |       3 |     10
              |       . |    5.79 |    2.48 |   8.26
              |       . |   70.00 |   30.00 |
              |       . |    7.53 |   10.71 |
     ---------+--------+--------+--------+
     101-250  |       5 |       5 |       8 |     13
              |       . |    4.13 |    6.61 |  10.74
              |       . |   38.46 |   61.54 |
              |       . |    5.38 |   28.57 |
     ---------+--------+--------+--------+
     251-500  |       3 |      10 |       1 |     11
              |       . |    8.26 |    0.83 |   9.09
              |       . |   90.91 |    9.09 |
              |       . |   10.75 |    3.57 |
     ---------+--------+--------+--------+
     501-1000 |       4 |      13 |       3 |     16
              |       . |   10.74 |    2.48 |  13.22
              |       . |   81.25 |   18.75 |
              |       . |   13.98 |   10.71 |
     ---------+--------+--------+--------+
     >1000    |       6 |      56 |       9 |     65
              |       . |   46.28 |    7.44 |  53.72
              |       . |   86.15 |   13.85 |
              |       . |   60.22 |   32.14 |
     ---------+--------+--------+--------+
     TOTAL            .        93        28      121
                      .     76.86     23.14   100.00
```

Total Current Enrollment in Science Courses

Table 166. Number and percent of institutions having various total enrollments in science courses, by institutions providing access to a computer for science faculty or students, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                    TABLE OF ENRMAJ BY COMPAC

ENRMAJ     NUMBER SCIENCE MAJORS ENROLLED   COMPAC     FACULTY-STI

FREQUENCY|
 PERCENT |            Science Faculty or Students
 ROW PCT |             Have Access to a Computer
 COL PCT |   .    |YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |      1 |     38 |     19 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-50     |     12 |      7 |     12 |     19
         |      . |   5.79 |   9.92 |  15.70
         |      . |  36.84 |  63.16 |
         |      . |   7.53 |  42.86 |
---------+--------+--------+--------+
51-100   |      3 |      8 |      6 |     14
         |      . |   6.61 |   4.96 |  11.57
         |      . |  57.14 |  42.86 |
         |      . |   8.60 |  21.43 |
---------+--------+--------+--------+
101-250  |      0 |     22 |      2 |     24
         |      . |  18.18 |   1.65 |  19.83
         |      . |  91.67 |   8.33 |
         |      . |  23.66 |   7.14 |
---------+--------+--------+--------+
251-500  |      7 |     23 |      5 |     28
         |      . |  19.01 |   4.13 |  23.14
         |      . |  82.14 |  17.86 |
         |      . |  24.73 |  17.86 |
---------+--------+--------+--------+
501-1000 |      0 |     11 |      2 |     13
         |      . |   9.09 |   1.65 |  10.74
         |      . |  84.62 |  15.38 |
         |      . |  11.83 |   7.14 |
---------+--------+--------+--------+
>1000    |      2 |     22 |      1 |     23
         |      . |  18.18 |   0.83 |  19.01
         |      . |  95.65 |   4.35 |
         |      . |  23.66 |   3.57 |
---------+--------+--------+--------+
TOTAL           .       93       28      121
                .    76.86    23.14   100.00
```

Number of Enrolled Science Majors

Table 167. Number and percent of institutions having various total numbers of science majors, by institutions providing access to a computer for science faculty or students, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                        TABLE OF SCICOUR BY UNDAC

SCICOUR   ARE ANY SCIENCE COURSES OFFERED   UNDAC      COMPUTERS

                        Science Undergraduates Have
FREQUENCY|                Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |        .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
    .    |     17 |     32 |      2 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |     53 |     86 |     11 |     97
         |      . |  87.76 |  11.22 |  98.98
         |      . |  88.66 |  11.34 |
         |      . |  98.85 | 100.00 |
---------+--------+--------+--------+
NC       |      1 |      1 |      0 |      1
         |      . |   1.02 |   0.00 |   1.02
         |      . | 100.00 |   0.00 |
         |      . |   1.15 |   0.00 |
---------+--------+--------+--------+
TOTAL           .       87       11       98
                .    88.78    11.22   100.00
```

Institution Offers Science Courses

Table 168. Number and percent of institutions offering science courses, by institutions providing access to a computer for science undergraduates, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Different Science Courses Offered 1978-79

```
                        TABLE OF DSC78 BY UNDAC

DSC78      N DIFFERENT SCIENCE COURSES 78-79   UNDAC      COMPUTER

FREQUENCY|          Science Undergraduates
PERCENT  |         Have Access to a Computer
ROW PCT  |
COL PCT  |       .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
 .       |      20|      36|       3|      .
         |       .|       .|       .|      .
         |       .|       .|       .|
         |       .|       .|       .|
---------+--------+--------+--------+
0-5      |       9|       2|       2|      4
         |       .|    2.15|    2.15|   4.30
         |       .|   50.00|   50.00|
         |       .|    2.41|   20.00|
---------+--------+--------+--------+
6-10     |      12|       2|       1|      3
         |       .|    2.15|    1.08|   3.23
         |       .|   66.67|   33.33|
         |       .|    2.41|   10.00|
---------+--------+--------+--------+
11-20    |       9|       5|       2|      7
         |       .|    5.38|    2.15|   7.53
         |       .|   71.43|   28.57|
         |       .|    6.02|   20.00|
---------+--------+--------+--------+
21-30    |      10|      13|       0|     13
         |       .|   13.98|    0.00|  13.98
         |       .|  100.00|    0.00|
         |       .|   15.66|    0.00|
---------+--------+--------+--------+
>30      |      11|      61|       5|     66
         |       .|   65.59|    5.38|  70.97
         |       .|   92.42|    7.58|
         |       .|   73.49|   50.00|
---------+--------+--------+--------+
TOTAL            .       83       10      93
                 .    89.25    10.75  100.00
```

Table 169. Number and percent of institutions offering different science courses by number, by institutions providing access to a computer for science undergraduates, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                TABLE OF SCIENR BY UNDAC

SCIENR     TOTAL SCIENCE CLASSES ENROLLMENT   UNDAC       COMPUTERS

                    Science Undergraduates
                  Have Access to a Computer
FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |     20 |     35 |      3 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-50     |      6 |      2 |      0 |      2
         |      . |   2.13 |   0.00 |   2.13
         |      . | 100.00 |   0.00 |
         |      . |   2.38 |   0.00 |
---------+--------+--------+--------+
51-100   |      7 |      6 |      1 |      7
         |      . |   6.38 |   1.06 |   7.45
         |      . |  85.71 |  14.29 |
         |      . |   7.14 |  10.00 |
---------+--------+--------+--------+
101-250  |     13 |      4 |      1 |      5
         |      . |   4.26 |   1.06 |   5.32
         |      . |  80.00 |  20.00 |
         |      . |   4.76 |  10.00 |
---------+--------+--------+--------+
251-500  |      4 |      9 |      1 |     10
         |      . |   9.57 |   1.06 |  10.64
         |      . |  90.00 |  10.00 |
         |      . |  10.71 |  10.00 |
---------+--------+--------+--------+
501-1000 |      6 |     11 |      3 |     14
         |      . |  11.70 |   3.19 |  14.89
         |      . |  78.57 |  21.43 |
         |      . |  13.10 |  30.00 |
---------+--------+--------+--------+
>1000    |     15 |     52 |      4 |     56
         |      . |  55.32 |   4.26 |  59.57
         |      . |  92.86 |   7.14 |
         |      . |  61.90 |  40.00 |
---------+--------+--------+--------+
TOTAL           .       84       10       94
                .    89.36    10.64   100.00
```

Total Current Enrollment in Science Courses

Table 170. Number and percent of institutions having various total enrollments in science courses, by institutions providing access to a computer for science undergraduates, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF ENRMAJ BY UNDAC

ENRMAJ     NUMBER SCIENCE MAJORS ENROLLED     UNDAC       COMPUTERS A

                     Science Undergraduates Have
                        Access to a Computer
FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |     20 |     35 |      3 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-50     |     24 |      3 |      4 |      7
         |      . |   3.19 |   4.26 |   7.45
         |      . |  42.86 |  57.14 |
         |      . |   3.57 |  40.00 |
---------+--------+--------+--------+
51-100   |      5 |      8 |      0 |      8
         |      . |   8.51 |   0.00 |   8.51
         |      . | 100.00 |   0.00 |
         |      . |   9.52 |   0.00 |
---------+--------+--------+--------+
101-250  |      1 |     20 |      3 |     23
         |      . |  21.28 |   3.19 |  24.47
         |      . |  86.96 |  13.04 |
         |      . |  23.81 |  30.00 |
---------+--------+--------+--------+
251-500  |     11 |     23 |      1 |     24
         |      . |  24.47 |   1.06 |  25.53
         |      . |  95.83 |   4.17 |
         |      . |  27.38 |  10.00 |
---------+--------+--------+--------+
501-1000 |      1 |     11 |      1 |     12
         |      . |  11.70 |   1.06 |  12.77
         |      . |  91.67 |   8.33 |
         |      . |  13.10 |  10.00 |
---------+--------+--------+--------+
>1000    |      5 |     19 |      1 |     20
         |      . |  20.21 |   1.06 |  21.28
         |      . |  95.00 |   5.00 |
         |      . |  22.62 |  10.00 |
---------+--------+--------+--------+
TOTAL           .       84       10       94
                .    89.36    10.64   100.00
```

Number of Enrolled Science Majors

Table 171. Number and percent of institutions having various total enrollments in science courses, by institutions providing access to a computer for science undergraduates, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

these variables is 0.41.

Whether or not graduate students in science departments have access to computer facilities appears to be 1) unrelated to whether or not an institution offers science courses (Again, lack of variance on this variable can be assumed to be causal here — see Table 172.); 2) inconsistently related to the number of different science courses offered by the institution (Caution is advised in interpreting this result since over three-fourths of the institutions providing data for Table 174 offer more than 30 different science courses, and very few institutions fall into other categories in the table.); 3) somewhat positively related to the institution's total current enrollment in science courses (Although the relationship between these variables has an associated contingency coefficient of 0.62, over two-thirds of the institutions supplying data for Table 175 have reported science enrollments exceeding 1000 students, leaving very few institutions in the other tabled enrollment categories. Therefore, the relationship between these variables must be regarded as uncertain.); and 4) strongly related to the number of enrolled science majors in the institution (See Table 176 , and note the discrepancy between the proportions of institutions in which science graduate students have access to computer facilities in those institutions with no more than 100 science majors, and in those institutions with 101 science majors or more. The associated contingency coefficient is 0.70).

Access to computing facilities for teaching faculty in science departments is the subject of Tables 177 through 180. Relationships between this variable and descriptors of the size of an institution's academic program in the sciences appear to be as follows: 1) there is no apparent relationship to whether or not the institution offers science courses, since virtually all institutions for which data are available do so (See Table 177); 2) there is a slightly

```
                               TABLE OF SCICOUR BY GRADAC

SCICOUR   ARE ANY SCIENCE COURSES OFFERED   GRADAC   COMPUTERS AVAILA

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|YES     |NO      |NOT APPL|  TOTAL
---------+--------+--------+--------+--------+
   .     |     37 |     11 |      3 |      0 |      .
         |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |
         |      . |      . |      . |      . |
---------+--------+--------+--------+--------+
YES      |     97 |     38 |     14 |      1 |     53
         |      . |  70.37 |  25.93 |   1.85 |  98.15
         |      . |  71.70 |  26.42 |   1.89 |
         |      . |  97.44 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+
NO       |      1 |      1 |      0 |      0 |      1
         |      . |   1.85 |   0.00 |   0.00 |   1.85
         |      . | 100.00 |   0.00 |   0.00 |
         |      . |   2.56 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+
TOTAL           .       39       14        1       54
                .    72.22    25.93     1.85   100.00
```

Science Graduate Students Have
Access to a Computer

Institution Offers Science Courses

Table 172. Number and percent of institutions offering science courses, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF DSC78 BY GRADAC

DSC78     N DIFFERENT SCIENCE COURSES 78-79     GRADAC      COMPUTERS AVA

FREQUENCY|           Science Graduate Students Have
PERCENT  |               Access to a Computer
ROW PCT  |
COL PCT  |        .|YES     |NO      |NOT APPL|  TOTAL
---------+--------+--------+--------+--------+
    .    |      42 |     12 |      5 |      0 |      .
         |       . |      . |      . |      . |      .
         |       . |      . |      . |      . |
         |       . |      . |      . |      . |
---------+--------+--------+--------+--------+
0-5      |      11 |      1 |      1 |      0 |      2
         |       . |   1.96 |   1.96 |   0.00 |   3.92
         |       . |  50.00 |  50.00 |   0.00 |
         |       . |   2.63 |   8.33 |   0.00 |
---------+--------+--------+--------+--------+
6-10     |      13 |      1 |      1 |      0 |      2
         |       . |   1.96 |   1.96 |   0.00 |   3.92
         |       . |  50.00 |  50.00 |   0.00 |
         |       . |   2.63 |   8.33 |   0.00 |
---------+--------+--------+--------+--------+
11-20    |      14 |      0 |      2 |      0 |      2
         |       . |   0.00 |   3.92 |   0.00 |   3.92
         |       . |   0.00 | 100.00 |   0.00 |
         |       . |   0.00 |  16.67 |   0.00 |
---------+--------+--------+--------+--------+
21-30    |      17 |      4 |      2 |      0 |      6
         |       . |   7.84 |   3.92 |   0.00 |  11.76
         |       . |  66.67 |  33.33 |   0.00 |
         |       . |  10.53 |  16.67 |   0.00 |
---------+--------+--------+--------+--------+
>30      |      38 |     32 |      6 |      1 |     39
         |       . |  62.75 |  11.76 |   1.96 |  76.47
         |       . |  82.05 |  15.38 |   2.56 |
         |       . |  84.21 |  50.00 | 100.00 |
---------+--------+--------+--------+--------+
TOTAL            .       38       12        1       51
                 .    74.51    23.53     1.96   100.00
```

Number of Different Science Courses Offered 1978-79

Table 174. Number and percent of institutions offering different science courses by number, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M                 10:48 S

                      TABLE OF SCIENR BY GRADAC

SCIENR     TOTAL SCIENCE CLASSES ENROLLMENT     GRADAC     COMPUTERS AVAI

                          Science Graduate Students
FREQUENCY|                Have Access to a Computer
 PERCENT |
 ROW PCT |
 COL PCT |        .|YES     |NO      |NCT APPL|  TOTAL
---------+---------+--------+--------+--------+
       . |      41 |     12 |      5 |      0 |      .
         |       . |      . |      . |      . |      .
         |       . |      . |      . |      . |
         |       . |      . |      . |      . |
---------+---------+--------+--------+--------+
0-50     |       7 |      0 |      1 |      0 |      1
         |       . |   0.00 |   1.96 |   0.00 |   1.96
         |       . |   0.00 | 100.00 |   0.00 |
         |       . |   0.00 |   8.33 |   0.00 |
---------+---------+--------+--------+--------+
51-100   |      13 |      0 |      1 |      0 |      1
         |       . |   0.00 |   1.96 |   0.00 |   1.96
         |       . |   0.00 | 100.00 |   0.00 |
         |       . |   0.00 |   8.33 |   0.00 |
---------+---------+--------+--------+--------+
101-250  |      15 |      0 |      3 |      0 |      3
         |       . |   0.00 |   5.88 |   0.00 |   5.88
         |       . |   0.00 | 100.00 |   0.00 |
         |       . |   0.00 |  25.00 |   0.00 |
---------+---------+--------+--------+--------+
251-500  |       7 |      5 |      2 |      0 |      7
         |       . |   9.80 |   3.92 |   0.00 |  13.73
         |       . |  71.43 |  28.57 |   0.00 |
         |       . |  13.16 |  16.67 |   0.00 |
---------+---------+--------+--------+--------+
501-1000 |      16 |      2 |      1 |      1 |      4
         |       . |   3.92 |   1.96 |   1.96 |   7.84
         |       . |  50.00 |  25.00 |  25.00 |
         |       . |   5.26 |   8.33 | 100.00 |
---------+---------+--------+--------+--------+
>1000    |      36 |     31 |      4 |      0 |     35
         |       . |  60.78 |   7.84 |   0.00 |  68.63
         |       . |  88.57 |  11.43 |   0.00 |
         |       . |  81.58 |  33.33 |   0.00 |
---------+---------+--------+--------+--------+
TOTAL             .       38       12        1       51
                  .    74.51    23.53     1.96   100.00
```

Total Current Enrollment in Science Courses

Table 175. Number and percent of institutions having various total enrollments in science courses, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education insitutions.

```
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M                    21:39 WEDN
                                                 -258-
               TABLE OF ENRMAJ BY GRADAC

ENRMAJ    NUMBER SCIENCE MAJORS ENROLLEC    GRADAC    COMPUTERS AVAILA

FREQUENCY|             Science Graduate Students
PERCENT  |             Have Access to a Computer
ROW PCT  |
COL PCT  |        .|YES     |NO      |NOT APPL|  TOTAL
---------+--------+--------+--------+--------+
       . |     41 |     12 |      5 |      0 |      .
         |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |
         |      . |      . |      . |      . |
---------+--------+--------+--------+--------+
0-50     |     26 |      0 |      5 |      0 |      5
         |      . |   0.00 |   9.80 |   0.00 |   9.80
         |      . |   0.00 | 100.00 |   0.00 |
         |      . |   0.00 |  41.67 |   0.00 |
---------+--------+--------+--------+--------+
51-100   |     13 |      0 |      4 |      0 |      4
         |      . |   0.00 |   7.84 |   0.00 |   7.84
         |      . |   0.00 | 100.00 |   0.00 |
         |      . |   0.00 |  33.33 |   0.00 |
---------+--------+--------+--------+--------+
101-250  |     20 |      3 |      0 |      1 |      4
         |      . |   5.88 |   0.00 |   1.96 |   7.84
         |      . |  75.00 |   0.00 |  25.00 |
         |      . |   7.89 |   0.00 | 100.00 |
---------+--------+--------+--------+--------+
251-500  |     25 |      8 |      2 |      0 |     10
         |      . |  15.69 |   3.92 |   0.00 |  19.61
         |      . |  80.00 |  20.00 |   0.00 |
         |      . |  21.05 |  16.67 |   0.00 |
---------+--------+--------+--------+--------+
501-1000 |      5 |      7 |      1 |      0 |      8
         |      . |  13.73 |   1.96 |   0.00 |  15.69
         |      . |  87.50 |  12.50 |   0.00 |
         |      . |  18.42 |   8.33 |   0.00 |
---------+--------+--------+--------+--------+
>1000    |      5 |     20 |      0 |      0 |     20
         |      . |  39.22 |   0.00 |   0.00 |  39.22
         |      . | 100.00 |   0.00 |   0.00 |
         |      . |  52.63 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+
TOTAL           .       38       12        1       51
                .    74.51    23.53     1.96   100.00
```

Number of Enrolled Science Majors

Table 176. Number and percent of institutions having various total numbers of science majors, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
TABLE OF SCICOUR BY ACCFAC

SCICOUR   ARE ANY SCIENCE COURSES CFFEREC   ACCFAC    COMP FACIL

FREQUENCY|
PERCENT  | Science Faculty Have Access to a Computer
ROW PCT  |
COL PCT  |   .    |YES     |NO      |  TOTAL
---------+--------+--------+--------+
   .     |     17 |     32 |      2 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |     52 |     92 |      6 |     98
         |      . |  92.93 |   6.06 |  98.99
         |      . |  93.88 |   6.12 |
         |      . |  98.92 | 100.00 |
---------+--------+--------+--------+
NO       |      1 |      1 |      0 |      1
         |      . |   1.01 |   0.00 |   1.01
         |      . | 100.00 |   0.00 |
         |      . |   1.08 |   0.00 |
---------+--------+--------+--------+
TOTAL           .       93        6       99
                .    93.94     6.06   100.00
```

Institution Offers Science Courses

Table 177. Number and percent of institutions offering science courses, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

positive relationship to the number of different science courses an institution offered during the 1978-79 school year (See Table 178), and note the associated contingency coefficient of 0.28); 3) there is virtually no relationship to an institution's total current enrollment in science courses as represented in Table 179, and as supported by an associated contingency coefficient of 0.19; and 4) there is virtually no relationship to the number of science majors currently enrolled in an institution (See Table 180 and consider the associated contingency coefficient of 0.23.).

It is reasonable to presume that computing facilities are more accessible to students and faculty for academic purposes if an institution's computer is located on its campus. Relationships between this variable and various descriptors of the size of the science program are summarized by the data in Tables 181 through 184. It appears that whether or not an institution's computer is located on campus is 1) unrelated to whether or not the institution offers any science courses (See Table 181 and note that almost all institutions offer science courses); 2) positively but very weakly related to the number of different science courses an institution offers (See Table 182); 3) positively but weakly related to the institution's current total enrollment in science courses (See Table 183 and note the associated contingency coefficient of 0.25 for these variables); and 4) virtually unrelated to the number of currently enrolled science majors at the institution (Table 184).

B. Relationships Between Courses and Students in the Sciences, and the Computing Skills of Students and Faculty in the Sciences

In this section we shall consider relationships between indicators of the size of minority institutions' academic programs in the sciences and reports of 178 heads of science departments in these institutions on the computing skills and capabilities of their students and faculty members. The descriptors

```
                    TABLE OF DSC78 BY ACCFAC

DSC78     N DIFFERENT SCIENCE COURSES 78-79    ACCFAC     COMP FA

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |  .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
    .    |     20 |     37 |      2 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-5      |      9 |      3 |      1 |      4
         |      . |   3.19 |   1.06 |   4.26
         |      . |  75.00 |  25.00 |
         |      . |   3.41 |  16.67 |
---------+--------+--------+--------+
6-10     |     12 |      2 |      1 |      3
         |      . |   2.13 |   1.06 |   3.19
         |      . |  66.67 |  33.33 |
         |      . |   2.27 |  16.67 |
---------+--------+--------+--------+
11-20    |      9 |      6 |      1 |      7
         |      . |   6.38 |   1.06 |   7.45
         |      . |  85.71 |  14.29 |
         |      . |   6.82 |  16.67 |
---------+--------+--------+--------+
21-30    |     10 |     13 |      0 |     13
         |      . |  13.83 |   0.00 |  13.83
         |      . | 100.00 |   0.00 |
         |      . |  14.77 |   0.00 |
---------+--------+--------+--------+
>30      |     10 |     64 |      3 |     67
         |      . |  68.09 |   3.19 |  71.28
         |      . |  95.52 |   4.48 |
         |      . |  72.73 |  50.00 |
---------+--------+--------+--------+
TOTAL           .       88        6       94
                .    93.62     6.38   100.00
```

Science Faculty Have Access to a Computer

Number of Different Science Courses Offered 1978-79

Table 178. Number and percent of institutions offering different science courses by number, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                    TABLE OF SCIENR BY ACCFAC

SCIENR     TOTAL SCIENCE CLASSES ENROLLMENT   ACCFAC    COMP FAC

FREQUENCY|  Science Faculty Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |  .      |YES      |NO       |  TOTAL
---------+---------+---------+---------+
       . |      20 |      36 |       2 |     .
         |       . |       . |       . |     .
         |       . |       . |       . |
         |       . |       . |       . |
---------+---------+---------+---------+
0-50     |       6 |       2 |       0 |     2
         |       . |    2.11 |    0.00 |  2.11
         |       . |  100.00 |    0.00 |
         |       . |    2.25 |    0.00 |
---------+---------+---------+---------+
51-100   |       7 |       6 |       1 |     7
         |       . |    6.32 |    1.05 |  7.37
         |       . |   85.71 |   14.29 |
         |       . |    6.74 |   16.67 |
---------+---------+---------+---------+
101-250  |      13 |       5 |       0 |     5
         |       . |    5.26 |    0.00 |  5.26
         |       . |  100.00 |    0.00 |
         |       . |    5.62 |    0.00 |
---------+---------+---------+---------+
251-500  |       4 |      10 |       0 |    10
         |       . |   10.53 |    0.00 | 10.53
         |       . |  100.00 |    0.00 |
         |       . |   11.24 |    0.00 |
---------+---------+---------+---------+
501-1000 |       6 |      12 |       2 |    14
         |       . |   12.63 |    2.11 | 14.74
         |       . |   85.71 |   14.29 |
         |       . |   13.48 |   33.33 |
---------+---------+---------+---------+
>1000    |      14 |      54 |       3 |    57
         |       . |   56.84 |    3.16 | 60.00
         |       . |   94.74 |    5.26 |
         |       . |   60.67 |   50.00 |
---------+---------+---------+---------+
TOTAL            .        89         6      95
                 .     93.68      6.32  100.00
```

Total Current Enrollment in Science Courses

Table 179. Number and percent of institutions having various total enrollments in science courses, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                    TABLE OF ENRMAJ BY ACCFAC

ENRMAJ     NUMBER SCIENCE MAJORS ENROLLED    ACCFAC     COMP FACILI

FREQUENCY|
 PERCENT | Science Faculty Have Access to a Computer
ROW PCT  |
COL PCT  |   .     |YES      |NO       |  TOTAL
---------+---------+---------+---------+
      .  |      20 |      36 |       2 |      .
         |       . |       . |       . |      .
         |       . |       . |       . |
         |       . |       . |       . |
---------+---------+---------+---------+
0-50     |      24 |       6 |       1 |      7
         |       . |    6.32 |    1.05 |   7.37
         |       . |   85.71 |   14.29 |
         |       . |    6.74 |   16.67 |
---------+---------+---------+---------+
51-100   |       9 |       8 |       0 |      8
         |       . |    8.42 |    0.00 |   8.42
         |       . |  100.00 |    0.00 |
         |       . |    8.99 |    0.00 |
---------+---------+---------+---------+
101-250  |       1 |      20 |       3 |     23
         |       . |   21.05 |    3.16 |  24.21
         |       . |   86.96 |   13.04 |
         |       . |   22.47 |   50.00 |
---------+---------+---------+---------+
251-500  |      11 |      22 |       2 |     24
         |       . |   23.16 |    2.11 |  25.26
         |       . |   91.67 |    8.33 |
         |       . |   24.72 |   33.33 |
---------+---------+---------+---------+
501-1000 |       2 |      11 |       0 |     11
         |       . |   11.58 |    0.00 |  11.58
         |       . |  100.00 |    0.00 |
         |       . |   12.36 |    0.00 |
---------+---------+---------+---------+
>1000    |       3 |      22 |       0 |     22
         |       . |   23.16 |    0.00 |  23.16
         |       . |  100.00 |    0.00 |
         |       . |   24.72 |    0.00 |
---------+---------+---------+---------+
TOTAL            .        89         6       95
                 .     93.68      6.32   100.00
```

Number of Enrolled Science Majors

Table 180. Number and percent of institutions having various total numbers of science majors, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                  TABLE OF SCICOUR BY CAMPCOMP

SCICOUR   ARE ANY SCIENCE COURSES OFFERED   CAMPCOMP  IS COMPUTE

FREQUENCY|
PERCENT  |        Computer is Located on Campus
ROW PCT  |
COL PCT  |        |YES     |NO      |
         |   .    |        |        |  TOTAL
---------+--------+--------+--------+
   .     |      0 |      0 |      1 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |     12 |     54 |     14 |     68
         |      . |  78.26 |  20.29 |  98.55
         |      . |  79.41 |  20.59 |
         |      . |  98.18 | 100.00 |
---------+--------+--------+--------+
NO       |      1 |      1 |      0 |      1
         |      . |   1.45 |   0.00 |   1.45
         |      . | 100.00 |   0.00 |
         |      . |   1.82 |   0.00 |
---------+--------+--------+--------+
TOTAL           .       55       14       69
                .    79.71    20.29   100.00
```

Institution Offers Science Courses

Table 181. Number and percent of institutions offering science courses, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Computer is Located on Campus

Number of Different Science Courses Offered 1978-79

```
                     TABLE OF DSC78 BY CAMPCOMP

DSC78       N DIFFERENT SCIENCE COURSES 78-79   CAMPCOMP  IS COMPL

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |        |YES     |NO      |
         |       .|        |        |  TOTAL
---------+--------+--------+--------+
       . |       1|       4|       1|      .
         |       .|       .|       .|      .
         |       .|       .|       .|
         |       .|       .|       .|
---------+--------+--------+--------+
0-5      |       4|       3|       2|      5
         |       .|    4.62|    3.08|   7.69
         |       .|   60.00|   40.00|
         |       .|    5.88|   14.29|
---------+--------+--------+--------+
6-10     |       4|       4|       3|      7
         |       .|    6.15|    4.62|  10.77
         |       .|   57.14|   42.86|
         |       .|    7.84|   21.43|
---------+--------+--------+--------+
11-20    |       2|       5|       3|      8
         |       .|    7.69|    4.62|  12.31
         |       .|   62.50|   37.50|
         |       .|    9.80|   21.43|
---------+--------+--------+--------+
21-30    |       2|      10|       1|     11
         |       .|   15.38|    1.54|  16.92
         |       .|   90.91|    9.09|
         |       .|   19.61|    7.14|
---------+--------+--------+--------+
>30      |       0|      29|       5|     34
         |       .|   44.62|    7.69|  52.31
         |       .|   85.29|   14.71|
         |       .|   56.86|   35.71|
---------+--------+--------+--------+
TOTAL            .       51       14      65
                 .    78.46    21.54  100.00
```

Table 182. Number and percent of institutions offering different science courses by number, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                          TABLE OF SCIENR BY CAMPCOMP

        SCIENR     TOTAL SCIENCE CLASSES ENROLLMENT    CAMPCOMP   IS COMPU

        FREQUENCY|
         PERCENT |         Computer is Located on Campus
         ROW PCT |
         COL PCT |         |YES      |NO       |
                 |    .    |         |         |  TOTAL
        ---------+---------+---------+---------+
              .  |       1 |       3 |       1 |       .
                 |       . |       . |       . |       .
                 |       . |       . |       . |
                 |       . |       . |       . |
        ---------+---------+---------+---------+
        0-50     |       3 |       2 |       2 |       4
                 |       . |    3,03 |    3,03 |    6,06
                 |       . |   50,00 |   50,00 |
                 |       . |    3,85 |   14,29 |
        ---------+---------+---------+---------+
        51-100   |       4 |       3 |       2 |       5
                 |       . |    4,55 |    3.03 |    7,58
                 |       . |   60.00 |   40,00 /
                 |       . |    5,77 |   14,29 |
        ---------+---------+---------+---------+
        101-250  |       4 |       6 |       2 |       8
                 |       . |    9,09 |    3,03 |   12,12
                 |       . |   75,00 |   25,00 |
                 |       . |   11,54 |   14,29 |
        ---------+---------+---------+---------+
        251-500  |       1 |       6 |       2 |       8
                 |       . |    9,09 |    3,03 |   12,12
                 |       . |   75,00 |   25,00 |
                 |       . |   11,54 |   14,29 |
        ---------+---------+---------+---------+
        501-1000 |       0 |      11 |       2 |      13
                 |       . |   16,67 |    3,03 |   19,70
                 |       . |   84,62 |   15,38 |
                 |       . |   21,15 |   14,29 |
        ---------+---------+---------+---------+
        >1000    |       0 |      24 |       4 |      28
                 |       . |   36,36 |    6,06 |   42,42
                 |       . |   85,71 |   14,29 |
                 |       . |   46,15 |   28,57 |
        ---------+---------+---------+---------+
        TOTAL            .        52        14        66
                         .     78,79     21,21    100,00
```

Total Current Enrollment in Science Courses

Table 183. Number and percent of institutions having various total enrollments in science courses by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
      S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                    21:36 WED
                                                -267-
                    TABLE OF ENRMAJ BY CAMPCOMP

             ENRMAJ     NUMBER SCIENCE MAJORS ENROLLED    CAMPCOMP  IS COMPUTER

             FREQUENCY|
              PERCENT |         Computer is Located on Campus
              ROW PCT |
              COL PCT |        |YES     |NO      |
                      |       .|        |        |  TOTAL
             ---------+--------+--------+--------+
                     .|       1|       2|       2|       .
                      |       .|       .|       .|       .
                      |       .|       .|       .|
                      |       .|       .|       .|
             ---------+--------+--------+--------+
             0-50     |      10|       9|       6|      15
                      |       .|   13.64|    9.09|   22.73
                      |       .|   60.00|   40.00|
                      |       .|   16.98|   46.15|
             ---------+--------+--------+--------+
             51-100   |       2|       6|       1|       7
                      |       .|    9.09|    1.52|   10.61
                      |       .|   85.71|   14.29|
                      |       .|   11.32|    7.69|
             ---------+--------+--------+--------+
             101-250  |       0|      11|       1|      12
                      |       .|   16.67|    1.52|   18.18
                      |       .|   91.67|    8.33|
                      |       .|   20.75|    7.69|
             ---------+--------+--------+--------+
             251-500  |       0|      15|       3|      18
                      |       .|   22.73|    4.55|   27.27
                      |       .|   83.33|   16.67|
                      |       .|   28.30|   23.08|
             ---------+--------+--------+--------+
             501-1000 |       0|       5|       1|       6
                      |       .|    7.58|    1.52|    9.09
                      |       .|   83.33|   16.67|
                      |       .|    9.43|    7.69|
             ---------+--------+--------+--------+
             >1000    |       0|       7|       1|       8
                      |       .|   10.61|    1.52|   12.12
                      |       .|   87.50|   12.50|
                      |       .|   13.21|    7.69|
             ---------+--------+--------+--------+
             TOTAL            .       53       13       66
                              .    80.30    19.70   100.00
```

Number of Enrolled Science Majors

Table 184. Number and percent of institutions having various total numbers of science majors, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

of the size of academic science programs used in Section A will also be used here. Since virtually all institutions for which data were reported offer at least one science course, whether or not an institution offers science courses will not be considered in further relational analyses. Recall that the remaining three variables involve the number of different science courses offered, the institution's current total enrollment in science courses, and the institution's current enrollment of majors in science.

Heads of science departments reported the percents of new students entering their departments in the fall of 1978, the percents of their currently enrolled students, and the percents of faculty in their departments who had computing skills at each of four levels. Data on each of these variables were related to the three indices of the size of an institution's academic science program, and results are reported in Tables 185 through 220.

Tables 185 through 188 provide data on relationships between the number of different science courses an institution offered during the 1978-79 academic year and science department heads' reports on the computing skills of students newly entering their departments in the fall of 1978. If these relationships were strong, one might conclude that institutions with large science programs tend to attract students with better backgrounds in computing. A causal interpretation is, perhaps, warranted here, since a temporal ordering of the variables is implicit in their definitions. The relationships shown in Tables 185 through 188 can be summarized as follows: The number of different science courses an institution offered during the 1978-79 academic year appears to be 1) only moderately negatively related to the percentage of newly entering students with no computer training or skills (From Table 185 we see that there is a slight tendency for a lower proportion of newly entering students to have no computer training or skills in institutions offering a larger number of

TABLE OF DSC78 BY NEWSKL1

DSC78 N DIFFERENT SCIENCE COURSES 78-79 NEWSKL1 PERC NEW STUD NO COMPUTER SKILLS

Percent of Newly Entering Students with No Computer Training or Skills

Number of Different Science Courses Offered 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	5 . . .	7 . . .	3 . . .	3 . . .	5 . . .	16 . . .	. .
0-5	9 . . .	0 0.00 0.00 0.00	2 2.27 50.00 14.29	1 1.14 25.00 12.50	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.14 25.00 2.86	4 4.55
6-10	12 . . .	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.14 33.33 12.50	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 2.27 66.67 5.71	3 3.41
11-20	10 . . .	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.14 16.67 7.69	5 5.68 83.33 14.29	6 6.82
21-30	10 . . .	1 1.14 7.69 8.33	1 1.14 7.69 7.14	1 1.14 7.69 12.50	2 2.27 15.38 33.33	4 4.55 30.77 30.77	4 4.55 30.77 11.43	13 14.77
>30	15 . . .	11 12.50 17.74 91.67	11 12.50 17.74 78.57	5 5.68 8.06 62.50	4 4.55 6.45 66.67	8 9.09 12.90 61.54	23 26.14 37.10 65.71	62 70.45
TOTAL	. .	12 13.64	14 15.91	8 9.09	6 6.82	13 14.77	35 39.77	88 100.00

Table 185. Number and percent of institutions offering various numbers of different science courses, by institutions with various percents of newly entering students with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

different science courses. The contingency coefficient associated with these variables is 0.44.); 2) moderately related in a positive direction to the percentage of newly entering students with general awareness of computers (See Table 186, and note the associated contingency coefficient of 0.46); 3) slightly positively related to the percentage of entering students with limited personal computer use and skill (See Table 187; the associated contingency coefficient equals 0.35); and 4) virtually unrelated to the percentage of newly entering students with the ability to program a computer (See Table 188, and note the associated contingency coefficient of 0.29.). All of the relationships shown in these tables were undoubtedly attenuated by the marginal distribution of the numbers of different science courses offered during the 1978-79 school year by the responding institutions; over 70 percent of the institutions were placed in a single category on this variable, since they were reported to offer at least 31 different science courses.

Tables 189 through 192 illustrate relationships between the number of different science courses an institution was reported to offer during the 1978-79 school year, and science department heads' reports on the computing skills of currently enrolled students. The causal interpretation offered in conjunction with Tables 185 through 188, above, does not apply here, since there is no implicit temporal ordering of these variables that would support an argument for directionality of effect. Relationships between the number of different science courses an institution offered during the 1978-79 academic year and the computing skills of currently enrolled students appear to be as follows: 1) there is a moderately negative relationship between science offerings and the percent of currently enrolled students with no computer training or skills (contingency coefficient equals 0.49 — see Table 189); 2) there is a moderately positive relationship between science offerings and

```
                            TABLE OF DSC78 BY NEWSKL2

DSC78     N DIFFERENT SCIENCE COURSES 78-79    NEWSKL2   PERC NEW STUD GENL AWARE OF COMPUTERS

FREQUENCY|
PERCENT  |        Percent of Newly Entering Students with General Awareness of Computers
ROW PCT  |
COL PCT  |      .|      0|1%-20% |21%-40%|41%-60%|61%-80%|81%-100%|  TOTAL
---------+-------+-------+-------+-------+-------+-------+--------+
    .    |     20|      9|     13|      4|      4|      3|       6|      .
         |      .|      .|      .|      .|      .|      .|       .|      .
         |      .|      .|      .|      .|      .|      .|       .|
         |      .|      .|      .|      .|      .|      .|       .|
---------+-------+-------+-------+-------+-------+-------+--------+
0-5      |      9|      0|      1|      0|      2|      0|       1|      4
         |      .|   0.00|   1.14|   0.00|   2.27|   0.00|    1.14|   4.55
         |      .|   0.00|  25.00|   0.00|  50.00|   0.00|   25.00|
         |      .|   0.00|   3.03|   0.00|  22.22|   0.00|    7.14|
---------+-------+-------+-------+-------+-------+-------+--------+
6-10     |     12|      1|      1|      1|      0|      0|       0|      3
         |      .|   1.14|   1.14|   1.14|   0.00|   0.00|    0.00|   3.41
         |      .|  33.33|  33.33|  33.33|   0.00|   0.00|    0.00|
         |      .|   5.88|   3.03|  12.50|   0.00|   0.00|    0.00|
---------+-------+-------+-------+-------+-------+-------+--------+
11-20    |     10|      2|      4|      0|      0|      0|       0|      6
         |      .|   2.27|   4.55|   0.00|   0.00|   0.00|    0.00|   6.82
         |      .|  33.33|  66.67|   0.00|   0.00|   0.00|    0.00|
         |      .|  11.76|  12.12|   0.00|   0.00|   0.00|    0.00|
---------+-------+-------+-------+-------+-------+-------+--------+
21-30    |     10|      1|      8|      1|      2|      1|       0|     13
         |      .|   1.14|   9.09|   1.14|   2.27|   1.14|    0.00|  14.77
         |      .|   7.69|  61.54|   7.69|  15.38|   7.69|    0.00|
         |      .|   5.88|  24.24|  12.50|  22.22|  14.29|    0.00|
---------+-------+-------+-------+-------+-------+-------+--------+
>30      |     15|     13|     19|      6|      5|      6|      13|     62
         |      .|  14.77|  21.59|   6.82|   5.68|   6.82|   14.77|  70.45
         |      .|  20.97|  30.65|   9.68|   8.06|   9.68|   20.97|
         |      .|  76.47|  57.58|  75.00|  55.56|  85.71|   92.86|
---------+-------+-------+-------+-------+-------+-------+--------+
TOTAL           .      17      33       8       9       7       14      88
                .   19.32   37.50    9.09   10.23    7.95    15.91  100.00
```

Number of Different Science Courses Offered 1978-79

Table 186. Number and percent of institutions offering various numbers of different science courses, by institutions with various percents of newly entering students with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
            S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                    21:39

                         TABLE OF DSC78 BY NEWSKL3

DSC78     N DIFFERENT SCIENCE COURSES 78-79     NEWSKL3     PERC NEW

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |  TOTAL
---------+--------+--------+--------+--------+
       . |     20 |     17 |     19 |      3 |      .
         |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |
         |      . |      . |      . |      . |
---------+--------+--------+--------+--------+
0-5      |      9 |      0 |      3 |      1 |      4
         |      . |   0.00 |   3.41 |   1.14 |   4.55
         |      . |   0.00 |  75.00 |  25.00 |
         |      . |   0.00 |   6.82 |  12.50 |
---------+--------+--------+--------+--------+
6-10     |     12 |      2 |      0 |      1 |      3
         |      . |   2.27 |   0.00 |   1.14 |   3.41
         |      . |  66.67 |   0.00 |  33.33 |
         |      . |   5.56 |   0.00 |  12.50 |
---------+--------+--------+--------+--------+
11-20    |     10 |      5 |      1 |      0 |      6
         |      . |   5.68 |   1.14 |   0.00 |   6.82
         |      . |  83.33 |  16.67 |   0.00 |
         |      . |  13.89 |   2.27 |   0.00 |
---------+--------+--------+--------+--------+
21-30    |     10 |      5 |      7 |      1 |     13
         |      . |   5.68 |   7.95 |   1.14 |  14.77
         |      . |  38.46 |  53.85 |   7.69 |
         |      . |  13.89 |  15.91 |  12.50 |
---------+--------+--------+--------+--------+
>30      |     15 |     24 |     33 |      5 |     62
         |      . |  27.27 |  37.50 |   5.68 |  70.45
         |      . |  38.71 |  53.23 |   8.06 |
         |      . |  66.67 |  75.00 |  62.50 |
---------+--------+--------+--------+--------+
TOTAL           .       36       44        8       88
                .    40.91    50.00     9.09   100.00
```

-272-

Percent of Newly Entering Students with Limited Personal Computer Use and Skill

Number of Different Science Courses Offered 1978-79

Table 187. Number and percent of institutions offering various numbers of different science courses, by institutions with various percents of newly entering students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF DSC78 BY NEWSKL4

DSC78      N DIFFERENT SCIENCE COURSES 78-79    NEWSKL4    PERC NEW STUD WHO CAN PROGRAM COM

FREQUENCY|
 PERCENT |   Percent of Newly Entering Students with Ability to Program a Computer
 ROW PCT |
 COL PCT |        .|        0|1%-20%   |21%-40%  |41%-60%  |81%-100%|  TOTAL
---------+---------+---------+---------+---------+---------+--------+
    .    |      20 |      26 |      12 |       1 |       0 |      0 |     .
         |       . |       . |       . |       . |       . |      . |     .
         |       . |       . |       . |       . |       . |      . |
         |       . |       . |       . |       . |       . |      . |
---------+---------+---------+---------+---------+---------+--------+
0-5      |       9 |       2 |       2 |       0 |       0 |      0 |     4
         |       . |    2.27 |    2.27 |    0.00 |    0.00 |   0.00 |  4.55
         |       . |   50.00 |   50.00 |    0.00 |    0.00 |   0.00 |
         |       . |    4.17 |    5.41 |    0.00 |    0.00 |   0.00 |
---------+---------+---------+---------+---------+---------+--------+
6-10     |      12 |       2 |       1 |       0 |       0 |      0 |     3
         |       . |    2.27 |    1.14 |    0.00 |    0.00 |   0.00 |  3.41
         |       . |   66.67 |   33.33 |    0.00 |    0.00 |   0.00 |
         |       . |    4.17 |    2.70 |    0.00 |    0.00 |   0.00 |
---------+---------+---------+---------+---------+---------+--------+
11-20    |      10 |       4 |       2 |       0 |       0 |      0 |     6
         |       . |    4.55 |    2.27 |    0.00 |    0.00 |   0.00 |  6.82
         |       . |   66.67 |   33.33 |    0.00 |    0.00 |   0.00 |
         |       . |    8.33 |    5.41 |    0.00 |    0.00 |   0.00 |
---------+---------+---------+---------+---------+---------+--------+
21-30    |      10 |       5 |       7 |       0 |       1 |      0 |    13
         |       . |    5.68 |    7.95 |    0.00 |    1.14 |   0.00 | 14.77
         |       . |   38.46 |   53.85 |    0.00 |    7.69 |   0.00 |
         |       . |   10.42 |   18.92 |    0.00 |  100.00 |   0.00 |
---------+---------+---------+---------+---------+---------+--------+
>30      |      13 |      35 |      25 |       1 |       0 |      1 |    62
         |       . |   39.77 |   28.41 |    1.14 |    0.00 |   1.14 | 70.45
         |       . |   56.45 |   40.32 |    1.61 |    0.00 |   1.61 |
         |       . |   72.92 |   67.57 |  100.00 |    0.00 | 100.00 |
---------+---------+---------+---------+---------+---------+--------+
TOTAL            .        48        37         1         1        1      88
                 .     54.55     42.05      1.14      1.14     1.14  100.00
```

Number of Different Science Courses Offered 1978-79

Table 188 Number and percent of institutions offering various numbers of different science courses, by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF DSC78 BY OLDSKL1

DSC78     N DIFFERENT SCIENCE COURSES 78-79    OLDSKL1    PERC CURRENT STUD NO COMPUTER SKILLS

FREQUENCY|
PERCENT  |    Percent of Currently Enrolled Students with No Computer Training or Skills
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40%  |41%-60%  |61%-80%  |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
 .       |     20 |     10 |      8 |      4 |      4 |      6 |      7 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-5      |      9 |      0 |      2 |      1 |      1 |      0 |      0 |      4
         |      . |   0.00 |   2.22 |   1.11 |   1.11 |   0.00 |   0.00 |   4.44
         |      . |   0.00 |  50.00 |  25.00 |  25.00 |   0.00 |   0.00 |
         |      . |   0.00 |  10.53 |   5.88 |  12.50 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
6-10     |     12 |      0 |      0 |      2 |      0 |      0 |      1 |      3
         |      . |   0.00 |   0.00 |   2.22 |   0.00 |   0.00 |   1.11 |   3.33
         |      . |   0.00 |   0.00 |  66.67 |   0.00 |   0.00 |  33.33 |
         |      . |   0.00 |   0.00 |  11.76 |   0.00 |   0.00 |   7.69 |
---------+--------+--------+--------+--------+--------+--------+--------+
11-20    |     10 |      0 |      0 |      0 |      1 |      2 |      3 |      6
         |      . |   0.00 |   0.00 |   0.00 |   1.11 |   2.22 |   3.33 |   6.67
         |      . |   0.00 |   0.00 |   0.00 |  16.67 |  33.33 |  50.00 |
         |      . |   0.00 |   0.00 |   0.00 |  12.50 |  22.22 |  23.08 |
---------+--------+--------+--------+--------+--------+--------+--------+
21-30    |     10 |      3 |      4 |      1 |      2 |      1 |      2 |     13
         |      . |   3.33 |   4.44 |   1.11 |   2.22 |   1.11 |   2.22 |  14.44
         |      . |  23.08 |  30.77 |   7.69 |  15.38 |   7.69 |  15.38 |
         |      . |  12.50 |  21.05 |   5.88 |  25.00 |  11.11 |  15.38 |
---------+--------+--------+--------+--------+--------+--------+--------+
>30      |     13 |     21 |     13 |     13 |      4 |      6 |      7 |     64
         |      . |  23.33 |  14.44 |  14.44 |   4.44 |   6.67 |   7.78 |  71.11
         |      . |  32.81 |  20.31 |  20.31 |   6.25 |   9.38 |  10.94 |
         |      . |  87.50 |  68.42 |  76.47 |  50.00 |  66.67 |  53.85 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       24       19       17        8        9       13       90
                .    26.67    21.11    18.89     8.89    10.00    14.44   100.00
```

Number of Different Science Courses Offered 1978-79

Table 189. Number and percent of institutions offering various numbers of different science courses, by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

the percentage of currently enrolled students with general awareness of computers (See Table 190 and note the associated contingency coefficient of 0.41); 3) there is a small but positive relationship between science offerings and the percentage of currently enrolled students with limited personal computer use and skill (Table 191, the contingency coefficient equals 0.46); and 4) there is a small but positive relationship, as shown in Table 192, between offerings in science and the percent of currently enrolled students with the ability to program a computer. This relationship, as is the case for those illustrated by the data in Tables 189 through 191, is clouded by the marginal distribution of the number of different science courses institutions offered during the 1978-79 academic year. The data are very sparse in the low end of the distribution. However, even if the three ranges of course offerings below 21 different science courses were collapsed, there would be a marked difference between the distributions of currently enrolled students with the ability to program a computer in institutions offering fewer than 21 different science courses, and for those in institutions offering at least 21 different science courses.

The reported computer training and skills of teaching faculty in science departments are related to the number of different science courses offered by minority institutions during the 1978-79 academic year in the data shown in Tables 193 through 196. Keeping in mind our previous comments on the marginal distribution of the number of different science courses offered by minority institutions during the 1978-79 academic year, relationships between this variable and the reported computer training and skills of teaching faculty in minority institutions' science departments are as follows: 1) there is a slight tendency for the percentage of faculty with no computer training or skills to be higher in institutions offering smaller numbers of different

```
                              TABLE OF DSC78 BY OLDSKL2

DSC78     N DIFFERENT SCIENCE COURSES 78-79    OLDSKL2   PERC CURRENT STUD GENL AWARE COMPUTER

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |      .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+-------+--------+--------+--------+--------+--------+--------+
   .     |    20 |      8 |     17 |      5 |      5 |      3 |      1 |     .
         |     . |      . |      . |      . |      . |      . |      . |     .
         |     . |      . |      . |      . |      . |      . |      . |
         |     . |      . |      . |      . |      . |      . |      . |
---------+-------+--------+--------+--------+--------+--------+--------+
0-5      |     9 |      1 |      0 |      2 |      0 |      1 |      0 |     4
         |     . |   1,11 |   0,00 |   2,22 |   0,00 |   1,11 |   0,00 |  4,44
         |     . |  25,00 |   0,00 |  50,00 |   0,00 |  25,00 |   0,00 |
         |     . |   6,25 |   0,00 |   8,70 |   0,00 |  12,50 |   0,00 |
---------+-------+--------+--------+--------+--------+--------+--------+
6-10     |    12 |      2 |      0 |      1 |      0 |      0 |      0 |     3
         |     . |   2,22 |   0,00 |   1,11 |   0,00 |   0,00 |   0,00 |  3,33
         |     . |  66,67 |   0,00 |  33,33 |   0,00 |   0,00 |   0,00 |
         |     . |  12,50 |   0,00 |   4,35 |   0,00 |   0,00 |   0,00 |
---------+-------+--------+--------+--------+--------+--------+--------+
11-20    |    10 |      1 |      4 |      1 |      0 |      0 |      0 |     6
         |     . |   1,11 |   4,44 |   1,11 |   0,00 |   0,00 |   0,00 |  6,67
         |     . |  16,67 |  66,67 |  16,67 |   0,00 |   0,00 |   0,00 |
         |     . |   6,25 |  13,33 |   4,35 |   0,00 |   0,00 |   0,00 |
---------+-------+--------+--------+--------+--------+--------+--------+
21-30    |    10 |      3 |      6 |      2 |      2 |      0 |      0 |    13
         |     . |   3,33 |   6,67 |   2,22 |   2,22 |   0,00 |   0,00 | 14,44
         |     . |  23,08 |  46,15 |  15,38 |  15,38 |   0,00 |   0,00 |
         |     . |  18,75 |  20,00 |   8,70 |  22,22 |   0,00 |   0,00 |
---------+-------+--------+--------+--------+--------+--------+--------+
>30      |    13 |      9 |     20 |     17 |      7 |      7 |      4 |    64
         |     . |  10,00 |  22,22 |  18,89 |   7,78 |   7,78 |   4,44 | 71,11
         |     . |  14,06 |  31,25 |  26,56 |  10,94 |  10,94 |   6,25 |
         |     . |  56,25 |  66,67 |  73,91 |  77,78 |  87,50 | 100,00 |
---------+-------+--------+--------+--------+--------+--------+--------+
TOTAL          .       16       30       23        9        8        4      90
               .    17,78    33,33    25,56    10,00     8,89     4,44  100,00
```

Percent of Currently Enrolled Students with General Awareness of Computers

Number of Different Science Courses Offered 1978-79

Table 190. Number and percent of institutions offering various numbers of different science courses, by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                             TABLE OF DSC78 BY OLDSKL3

DSC78      N DIFFERENT SCIENCE COURSES 78-79    OLDSKL3   PERC CURRENT STUD LIMITED COMPUTER US

FREQUENCYI
 PERCENT  I  Percent of Currently Enrolled Students with Limited Personal Computer Use and Skill
 ROW PCT  I
 COL PCT  I       .I        0I1%-20%  I21%-40% I41%-60% I61%-80% I81%-100%I  TOTAL
---------+--------+---------+--------+--------+--------+--------+--------+
     .    I     20 I       9 I     21 I      4 I      2 I      1 I      2 I     .
          I      . I       . I      . I      . I      . I      . I      . I     .
          I      . I       . I      . I      . I      . I      . I      . I
          I      . I       . I      . I      . I      . I      . I      . I
---------+--------+---------+--------+--------+--------+--------+--------+
0-5       I      9 I       0 I      2 I      2 I      0 I      0 I      0 I      4
          I      . I    0.00 I   2.22 I   2.22 I   0.00 I      . I   0.00 I   4.44
          I      . I    0.00 I  50.00 I  50.00 I   0.00 I      . I   0.00 I
          I      . I    0.00 I   3.92 I  15.38 I   0.00 I      . I   0.00 I
---------+--------+---------+--------+--------+--------+--------+--------+
6-10      I     12 I       1 I      0 I      1 I      1 I      0 I      0 I      3
          I      . I    1.11 I   0.00 I   1.11 I   1.11 I      . I   0.00 I   3.33
          I      . I   33.33 I   0.00 I  33.33 I  33.33 I      . I   0.00 I
          I      . I    5.88 I   0.00 I   7.69 I  14.29 I      . I   0.00 I
---------+--------+---------+--------+--------+--------+--------+--------+
11-20     I     10 I       3 I      3 I      0 I      0 I      0 I      0 I      6
          I      . I    3.33 I   3.33 I   0.00 I   0.00 I      . I   0.00 I   6.67
          I      . I   50.00 I  50.00 I   0.00 I   0.00 I      . I   0.00 I
          I      . I   17.65 I   5.88 I   0.00 I   0.00 I      . I   0.00 I
---------+--------+---------+--------+--------+--------+--------+--------+
21-30     I     10 I       6 I      6 I      1 I      0 I      0 I      0 I     13
          I      . I    6.67 I   6.67 I   1.11 I   0.00 I      . I   0.00 I  14.44
          I      . I   46.15 I  46.15 I   7.69 I   0.00 I      . I   0.00 I
          I      . I   35.29 I  11.76 I   7.69 I   0.00 I      . I   0.00 I
---------+--------+---------+--------+--------+--------+--------+--------+
>30       I     13 I       7 I     40 I      9 I      6 I      0 I      2 I     64
          I      . I    7.78 I  44.44 I  10.00 I   6.67 I      . I   2.22 I  71.11
          I      . I   10.94 I  62.50 I  14.06 I   9.38 I      . I   3.13 I
          I      . I   41.18 I  78.43 I  69.23 I  85.71 I      . I 100.00 I
---------+--------+---------+--------+--------+--------+--------+--------+
TOTAL            .        17       51       13        7        .        2       90
                 .     18.89    56.67    14.44     7.78        .     2.22   100.00
```

Number of Different Science Courses Offered 1978-79

Table 191. Number and percent of institutions offering various numbers of different science courses, by institutions with various percents of currently enrolled students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF DSC78 BY OLDSKL4

DSC78      N DIFFERENT SCIENCE COURSES 78-79    OLDSKL4    PERC CURRENT STUD WHO CAN PROGRAM COM

FREQUENCY|
 PERCENT |       Percent of Currently Enrolled Students with Ability to Program a Computer
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |      20|      12|      16|       5|       4|       1|       1|     .
         |       .|       .|       .|       .|       .|       .|       .|     .
         |       .|       .|       .|       .|       .|       .|       .|
         |       .|       .|       .|       .|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
0-5      |       9|       0|       2|       2|       0|       0|       0|      4
         |       .|    0.00|    2.22|    2.22|    0.00|    0.00|    0.00|   4.44
         |       .|    0.00|   50.00|   50.00|    0.00|    0.00|    0.00|
         |       .|    0.00|    4.76|   18.18|    0.00|    0.00|    0.00|
---------+--------+--------+--------+--------+--------+--------+--------+
6-10     |      12|       1|       1|       1|       0|       0|       0|      3
         |       .|    1.11|    1.11|    1.11|    0.00|    0.00|    0.00|   3.33
         |       .|   33.33|   33.33|   33.33|    0.00|    0.00|    0.00|
         |       .|    4.55|    2.38|    9.09|    0.00|    0.00|    0.00|
---------+--------+--------+--------+--------+--------+--------+--------+
11-20    |      10|       2|       4|       0|       0|       0|       0|      6
         |       .|    2.22|    4.44|    0.00|    0.00|    0.00|    0.00|   6.67
         |       .|   33.33|   66.67|    0.00|    0.00|    0.00|    0.00|
         |       .|    9.09|    9.52|    0.00|    0.00|    0.00|    0.00|
---------+--------+--------+--------+--------+--------+--------+--------+
21-30    |      10|       3|       5|       1|       2|       1|       1|     13
         |       .|    3.33|    5.56|    1.11|    2.22|    1.11|    1.11|  14.44
         |       .|   23.08|   38.46|    7.69|   15.38|    7.69|    7.69|
         |       .|   13.64|   11.90|    9.09|   28.57|   25.00|   25.00|
---------+--------+--------+--------+--------+--------+--------+--------+
>30      |      13|      16|      30|       7|       5|       3|       3|     64
         |       .|   17.78|   33.33|    7.78|    5.56|    3.33|    3.33|  71.11
         |       .|   25.00|   46.88|   10.94|    7.81|    4.69|    4.69|
         |       .|   72.73|   71.43|   63.64|   71.43|   75.00|   75.00|
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL            .       22       42       11        7        4        4       90
                 .    24.44    46.67    12.22     7.78     4.44     4.44   100.00
```

Number of Different Science Courses Offered 1978-79

Table 192. Number and percent of institutions offering various numbers of different science courses, by institutions with various percents of currently enrolled students with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

science courses (See Table 193; the associated contingency coefficient equals 0.48); 2) there is a slight tendency for the percentage of faculty with general awareness of computers to be higher in institutions offering larger numbers of different science courses (See Table 194; and note the contingency coefficient of 0.34); 3) there is virtually no relationship between the percentage of faculty with limited personal computer use and skill and the number of different science courses offered by an institution (See Table 195; the contingency coefficient equals 0.33); and 4) there is a very slight positive relationship between the percentage of faculty with the ability to program a computer and the number of different science courses offered (See Table 196; the contingency coefficient equals 0.34).

Relationships between academic vice presidents/deans reports on their institutions' total current enrollments in science courses, and science department heads' reports on the computer training and skills of newly entering students (fall, 1978), currently enrolled students, and their teaching faculties are illustrated in Tables 197 through 208. To summarize the results contained in these tables, an institution's current enrollment in science courses appears to be: 1) only slightly related to the percentage of newly entering students with no computer training or skills (Table 197; the contingency coefficient equals 0.44, but conditional distributions are bimodal, making interpretation difficult; 2) moderately and positively related to the percentage of newly entering students with general awareness of computers (See Table 198 and note the associated contingency coefficient of 0.50); 3) virtually unrelated to the percentage of newly entering students with limited computer use and skill (See Table 199 and note the contingency coefficient of 0.33); 4) only slightly positively related to the percentage of newly entering students with the ability to program a computer (See Table 200, and note the large percentage of

```
                              TABLE OF DSC78 BY FACSKL1

DSC78     N DIFFERENT SCIENCE COURSES 78-79    FACSKL1    PERCENT FACULTY NO COMPUTER SKILLS

FREQUENCY|
PERCENT  |          Percent of Faculty with No Computer Training or Skills
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40%  |41%-60%  |61%-80%  |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     20 |     26 |      6 |      3 |      3 |      1 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-5      |      9 |      3 |      0 |      0 |      0 |      0 |      1 |      4
         |      . |   3.26 |   0.00 |   0.00 |   0.00 |   0.00 |   1.09 |   4.35
         |      . |  75.00 |   0.00 |   0.00 |   0.00 |   0.00 |  25.00 |
         |      . |   5.36 |   0.00 |   0.00 |   0.00 |   0.00 |  25.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
6-10     |     12 |      1 |      0 |      1 |      1 |      0 |      0 |      3
         |      . |   1.09 |   0.00 |   1.09 |   1.09 |   0.00 |   0.00 |   3.26
         |      . |  33.33 |   0.00 |  33.33 |  33.33 |   0.00 |   0.00 |
         |      . |   1.79 |   0.00 |   9.09 |  20.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
11-20    |      9 |      3 |      0 |      3 |      1 |      0 |      0 |      7
         |      . |   3.26 |   0.00 |   3.26 |   1.09 |   0.00 |   0.00 |   7.61
         |      . |  42.86 |   0.00 |  42.86 |  14.29 |   0.00 |   0.00 |
         |      . |   5.36 |   0.00 |  27.27 |  20.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
21-30    |     10 |      9 |      1 |      0 |      0 |      2 |      1 |     13
         |      . |   9.78 |   1.09 |   0.00 |   0.00 |   2.17 |   1.09 |  14.13
         |      . |  69.23 |   7.69 |   0.00 |   0.00 |  15.38 |   7.69 |
         |      . |  16.07 |   9.09 |   0.00 |   0.00 |  40.00 |  25.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>30      |     12 |     40 |     10 |      7 |      3 |      3 |      2 |     65
         |      . |  43.48 |  10.87 |   7.61 |   3.26 |   3.26 |   2.17 |  70.65
         |      . |  61.54 |  15.38 |  10.77 |   4.62 |   4.62 |   3.08 |
         |      . |  71.43 |  90.91 |  63.64 |  60.00 |  60.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       56       11       11        5        5        4       92
                .    60.87    11.96    11.96     5.43     5.43     4.35   100.00
```

Number of Different Science Courses Offered 1978-79

Table 193. Number and percent of institutions offering various numbers of different science courses, by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                                 TABLE OF DSC78 BY FACSKL2

DSC78      N DIFFERENT SCIENCE COURSES 78-79    FACSKL2   PERC FACULTY GENL AWARE OF COMPUTERS

 FREQUENCY|
 PERCENT  |            Percent of Faculty with General Awareness of Computers
 ROW PCT  |
 COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
----------+--------+--------+--------+--------+--------+--------+--------+
    .     |     20 |     15 |      4 |      8 |      3 |      7 |      2 |      .
          |      . |      . |      . |      . |      . |      . |      . |      .
          |      . |      . |      . |      . |      . |      . |      . |
          |      . |      . |      . |      . |      . |      . |      . |
----------+--------+--------+--------+--------+--------+--------+--------+
0-5       |      9 |      1 |      2 |      0 |      1 |      0 |      0 |      4
          |      . |   1,09 |   2,17 |   0,00 |   1,09 |   0,00 |   0,00 |   4,35
          |      . |  25,00 |  50,00 |   0,00 |  25,00 |   0,00 |   0,00 |
          |      . |   5,00 |   8,33 |   0,00 |   6,25 |   0,00 |   0,00 |
----------+--------+--------+--------+--------+--------+--------+--------+
6-10      |     12 |      2 |      0 |      1 |      0 |      0 |      0 |      3
          |      . |   2,17 |   0,00 |   1,09 |   0.00 |   0.00 |   0,00 |   3,26
          |      . |  66,67 |   0,00 |  33,33 |   0.00 |   0,00 |   0,00 |
          |      . |  10,00 |   0,00 |   4,17 |   0.00 |   0,00 |   0,00 |
----------+--------+--------+--------+--------+--------+--------+--------+
11-20     |      9 |      1 |      1 |[illegible]|    2 |      1 |      0 |      7
          |      . |   1,09 |   1,09 |   2,17 |   2,17 |   1,09 |   0,00 |   7,61
          |      . |  14,29 |  14,29 |  28,57 |  28,57 |  14,29 |   0,00 |
          |      . |   5,00 |   4,17 |   8,33 |  12,50 |  14,29 |   0,00 |
----------+--------+--------+--------+--------+--------+--------+--------+
21-30     |     10 |      2 |      5 |      3 |      1 |      2 |      0 |     13
          |      . |   2,17 |   5,43 |   3,26 |   1,09 |   2,17 |   0,00 |  14,13
          |      . |  15,38 |  38.46 |  23,08 |   7,69 |  15,38 |   0,00 |
          |      . |  10,00 |  20,83 |  12,50 |   6,25 |  28,57 |   0,00 |
----------+--------+--------+--------+--------+--------+--------+--------+
>30       |     12 |     14 |     16 |     18 |     12 |      4 |      1 |     65
          |      . |  15,22 |  17.39 |  19,57 |  13,04 |   4,35 |   1,09 |  70,65
          |      . |  21,54 |  24,62 |  27,69 |  18,46 |   6,15 |   1,54 |
          |      . |  70,00 |  66,67 |  75,00 |  75,00 |  57,14 | 100,00 |
----------+--------+--------+--------+--------+--------+--------+--------+
TOTAL            .       20       24       24       16        7        1       92
                 .    21,74    26.09    26,09    17.39     7,61     1,09   100,00
```

Number of Different Science Courses Offered 1978-79

Table 194. Number and percent of institutions offering various numbers of different science courses, by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF DSC78 BY FACSKL3

DSC78     N DIFFERENT SCIENCE COURSES 78-79     FACSKL3   PERC FACULTY LIMITED COMPUTER USE-SKI

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     20 |      8 |     19 |      5 |      5 |      0 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-5      |      9 |      1 |      1 |      1 |      0 |      1 |      0 |      4
         |      . |   1,09 |   1,09 |   1,09 |   0,00 |   1,09 |   0,00 |   4,35
         |      . |  25,00 |  25,00 |  25,00 |   0,00 |  25,00 |   0,00 |
         |      . |   5,56 |   2,94 |   4,17 |   0,00 |  25,00 |   0,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
6-10     |     12 |      1 |      0 |      1 |      1 |      0 |      0 |      3
         |      . |   1,09 |   0,00 |   1,09 |   1,09 |   0,00 |   0,00 |   3,26
         |      . |  33,33 |   0,00 |  33,33 |  33,33 |   0,00 |   0,00 |
         |      . |   5,56 |   0,00 |   4,17 |   9,09 |   0,00 |   0,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
11-20    |      9 |      2 |      3 |      2 |      0 |      0 |      0 |      7
         |      . |   2,17 |   3,26 |   2,17 |   0,00 |   0,00 |   0,00 |   7,61
         |      . |  28,57 |  42,86 |  28,57 |   0,00 |   0,00 |   0,00 |
         |      . |  11,11 |   8,82 |   8,33 |   0,00 |   0,00 |   0,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
21-30    |     10 |      3 |      6 |      2 |      1 |      1 |      0 |     13
         |      . |   3,26 |   6,52 |   2,17 |   1,09 |   1,09 |   0,00 |  14,13
         |      . |  23,08 |  46,15 |  15,38 |   7,69 |   7,69 |   0,00 |
         |      . |  16,67 |  17,65 |   8,33 |   9,09 |  25,00 |   0,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>30      |     12 |     11 |     24 |     18 |      9 |      2 |      1 |     65
         |      . |  11,96 |  26,09 |  19,57 |   9,78 |   2,17 |   1,09 |  70,65
         |      . |  16,92 |  36,92 |  27,69 |  13,85 |   3,08 |   1,54 |
         |      . |  61,11 |  70,59 |  75,00 |  81,82 |  50,00 | 100,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       18       34       24       11        4        1       92
                .    19,57    36,96    26,09    11,96     4,35     1,09   100,00
```

Percent of Faculty with Limited Personal Computer Use and Skill

Number of Different Science Courses Offered 1978-79

Table 195. Number and percent of institutions offering various numbers of different science courses, by institutions with various percents of faculty with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Different Science Courses Offered 1978-79

```
                              TABLE OF DSC78 BY FACSKL4

DSC78     N DIFFERENT SCIENCE COURSES 78-79    FACSKL4   PERC FACULTY WHO CAN PROGRAM COMPUTER

FREQUENCY|
PERCENT  |
ROW PCT  |          Percent of Faculty with Ability to Program a Computer
COL PCT  |
         |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |      20|       7|      10|       6|       7|       3|       6|
         |       .|       .|       .|       .|       .|       .|       .|      .
         |       .|       .|       .|       .|       .|       .|       .|      .
         |       .|       .|       .|       .|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
0-5      |       9|       1|       2|       0|       0|       0|       1|      4
         |       .|    1.09|    2.17|    0.00|    0.00|    0.00|    1.09|   4.35
         |       .|   25.00|   50.00|    0.00|    0.00|    0.00|   25.00|
         |       .|    8.33|    7.41|    0.00|    0.00|    0.00|    8.33|
---------+--------+--------+--------+--------+--------+--------+--------+
6-10     |      12|       1|       0|       1|       0|       0|       1|      3
         |       .|    1.09|    0.00|    1.09|    0.00|    0.00|    1.09|   3.26
         |       .|   33.33|    0.00|   33.33|    0.00|    0.00|   33.33|
         |       .|    8.33|    0.00|    3.85|    0.00|    0.00|    8.33|
---------+--------+--------+--------+--------+--------+--------+--------+
11-20    |       9|       1|       2|       3|       0|       0|       1|      7
         |       .|    1.09|    2.17|    3.26|    0.00|    0.00|    1.09|   7.61
         |       .|   14.29|   28.57|   42.86|    0.00|    0.00|   14.29|
         |       .|    8.33|    7.41|   11.54|    0.00|    0.00|    8.33|
---------+--------+--------+--------+--------+--------+--------+--------+
21-30    |      10|       3|       2|       4|       2|       1|       1|     13
         |       .|    3.26|    2.17|    4.35|    2.17|    1.09|    1.09|  14.13
         |       .|   23.08|   15.38|   30.77|   15.38|    7.69|    7.69|
         |       .|   25.00|    7.41|   15.38|   18.18|   25.00|    8.33|
---------+--------+--------+--------+--------+--------+--------+--------+
>30      |      12|       6|      21|      18|       9|       3|       8|     65
         |       .|    6.52|   22.83|   19.57|    9.78|    3.26|    8.70|  70.65
         |       .|    9.23|   32.31|   27.69|   13.85|    4.62|   12.31|
         |       .|   50.00|   77.78|   69.23|   81.82|   75.00|   66.67|
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       12       27       26       11        4       12       92
                .    13.04    29.35    28.26    11.96     4.35    13.04   100.00
```

Table 196. Number and percent of institutions offering various numbers of different science courses, by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                                                                  10:48 SUNDAY, SEPTEMBE

                         TABLE OF SCIENR BY NEWSKL1

SCIENR    TOTAL SCIENCE CLASSES ENROLLMENT   NEWSKL1   PERC NEW STUD NO COMPUTER SKILLS

FREQUENCY|
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20% |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |      20|       5|       6|       3|       3|       5|      16|      .
         |       .|       .|       .|       .|       .|       .|       .|      .
         |       .|       .|       .|       .|       .|       .|       .|
         |       .|       .|       .|       .|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |       6|       0|       1|       0|       0|       0|       1|      2
         |       .|    0.00|    1.12|    0.00|    0.00|    0.00|    1.12|   2.25
         |       .|    0.00|   50.00|    0.00|    0.00|    0.00|   50.00|
         |       .|    0.00|    6.67|    0.00|    0.00|    0.00|    2.86|
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |       8|       0|       0|       0|       0|       1|       5|      6
         |       .|    0.00|    0.00|    0.00|    0.00|    1.12|    5.62|   6.74
         |       .|    0.00|    0.00|    0.00|    0.00|   16.67|   83.33|
         |       .|    0.00|    0.00|    0.00|    0.00|    7.69|   14.29|
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      13|       0|       1|       0|       1|       1|       2|      5
         |       .|    0.00|    1.12|    0.00|    1.12|    1.12|    2.25|   5.62
         |       .|    0.00|   20.00|    0.00|   20.00|   20.00|   40.00|
         |       .|    0.00|    6.67|    0.00|   16.67|    7.69|    5.71|
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |       4|       1|       2|       2|       0|       3|       2|     10
         |       .|    1.12|    2.25|    2.25|    0.00|    3.37|    2.25|  11.24
         |       .|   10.00|   20.00|   20.00|    0.00|   30.00|   20.00|
         |       .|    8.33|   13.33|   25.00|    0.00|   23.08|    5.71|
---------+--------+--------+--------+--------+--------+--------+--------+
501-1000 |       8|       1|       1|       3|       1|       1|       5|     12
         |       .|    1.12|    1.12|    3.37|    1.12|    1.12|    5.62|  13.48
         |       .|    8.33|    8.33|   25.00|    8.33|    8.33|   41.67|
         |       .|    8.33|    6.67|   37.50|   16.67|    7.69|   14.29|
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      17|      10|      10|       3|       4|       7|      20|     54
         |       .|   11.24|   11.24|    3.37|    4.49|    7.87|   22.47|  60.67
         |       .|   18.52|   18.52|    5.56|    7.41|   12.96|   37.04|
         |       .|   83.33|   66.67|   37.50|   66.67|   53.85|   57.14|
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL            .       12       15        8        6       13       35      89
                 .    13.48    16.85     8.99     6.74    14.61    39.33  100.00
```

Percent of Newly Entering Students with No Computer Training or Skills

Total Current Enrollment in Science Courses

Table 197 Number and percent of institutions having various total enrollments in science

```
                              TABLE OF SCIENR BY NEWSKL2

SCIENR     TOTAL SCIENCE CLASSES ENROLLMENT   NEWSKL2   PERC NEW STUD GENL AWARE OF COMPUTERS

FREQUENCY|
 PERCENT |
 ROW PCT |
 COL PCT |       .|        0|1%-20%  |21%-40%  |41%-60%  |61%-80%  |81%-100%|  TOTAL
---------+--------+---------+---------+---------+---------+---------+---------+
       . |     20 |       9 |      13 |       3 |       4 |       3 |       6 |      .
         |      . |       . |       . |       . |       . |       . |       . |      .
         |      . |       . |       . |       . |       . |       . |       . |
         |      . |       . |       . |       . |       . |       . |       . |
---------+--------+---------+---------+---------+---------+---------+---------+
0-50     |      6 |       0 |       1 |       1 |       0 |       0 |       0 |      2
         |      . |    0.00 |    1.12 |    1.12 |    0.00 |    0.00 |    0.00 |   2.25
         |      . |    0.00 |   50.00 |   50.00 |    0.00 |    0.00 |    0.00 |
         |      . |    0.00 |    3.03 |   11.11 |    0.00 |    0.00 |    0.00 |
---------+--------+---------+---------+---------+---------+---------+---------+
51-100   |      8 |       3 |       3 |       0 |       0 |       0 |       0 |      6
         |      . |    3.37 |    3.37 |    0.00 |    0.00 |    0.00 |    0.00 |   6.74
         |      . |   50.00 |   50.00 |    0.00 |    0.00 |    0.00 |    0.00 |
         |      . |   17.65 |    9.09 |    0.00 |    0.00 |    0.00 |    0.00 |
---------+--------+---------+---------+---------+---------+---------+---------+
101-250  |     13 |       0 |       3 |       0 |       1 |       0 |       1 |      5
         |      . |    0.00 |    3.37 |    0.00 |    1.12 |    0.00 |    1.12 |   5.62
         |      . |    0.00 |   60.00 |    0.00 |   20.00 |    0.00 |   20.00 |
         |      . |    0.00 |    9.09 |    0.00 |   11.11 |    0.00 |    7.14 |
---------+--------+---------+---------+---------+---------+---------+---------+
251-500  |      4 |       1 |       5 |       0 |       1 |       3 |       0 |     10
         |      . |    1.12 |    5.62 |    0.00 |    1.12 |    3.37 |    0.00 |  11.24
         |      . |   10.00 |   50.00 |    0.00 |   10.00 |   30.00 |    0.00 |
         |      . |    5.88 |   15.15 |    0.00 |   11.11 |   42.86 |    0.00 |
---------+--------+---------+---------+---------+---------+---------+---------+
501-1000 |      8 |       3 |       3 |       2 |       3 |       0 |       1 |     12
         |      . |    3.37 |    3.37 |    2.25 |    3.37 |    0.00 |    1.12 |  13.48
         |      . |   25.00 |   25.00 |   16.67 |   25.00 |    0.00 |    8.33 |
         |      . |   17.65 |    9.09 |   22.22 |   33.33 |    0.00 |    7.14 |
---------+--------+---------+---------+---------+---------+---------+---------+
>1000    |     17 |      10 |      18 |       6 |       4 |       4 |      12 |     54
         |      . |   11.24 |   20.22 |    6.74 |    4.49 |    4.49 |   13.48 |  60.67
         |      . |   18.52 |   33.33 |   11.11 |    7.41 |    7.41 |   22.22 |
         |      . |   58.82 |   54.55 |   66.67 |   44.44 |   57.14 |   85.71 |
---------+--------+---------+---------+---------+---------+---------+---------+
TOTAL           .        17        33         9         9         7        14       89
                .     19.10     37.08     10.11     10.11      7.87     15.73   100.00
```

Percent of Newly Entering Students with General Awareness of Computers

Total Current Enrollment in Science Courses

Table 198. Number and percent of institutions having various total enrollments in science courses,

Percent of Newly Entering Students with Limited Personal Computer Use and Skill

Total Current Enrollment in Science Courses

```
                     TABLE OF SCIENR BY NEWSKL3

SCIENR    TOTAL SCIENCE CLASSES ENROLLMENT   NEWSKL3   PERC NEW STUC I

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |  TOTAL
---------+--------+--------+--------+--------+
       . |     20 |     17 |     19 |      2 |      .
         |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |
         |      . |      . |      . |      . |
---------+--------+--------+--------+--------+
0-50     |      6 |      1 |      0 |      1 |      2
         |      . |   1.12 |   0.00 |   1.12 |   2.25
         |      . |  50.00 |   0.00 |  50.00 |
         |      . |   2.78 |   0.00 |  11.11 |
---------+--------+--------+--------+--------+
51-100   |      8 |      5 |      1 |      0 |      6
         |      . |   5.62 |   1.12 |   0.00 |   6.74
         |      . |  83.33 |  16.67 |   0.00 |
         |      . |  13.89 |   2.27 |   0.00 |
---------+--------+--------+--------+--------+
101-250  |     13 |      2 |      3 |      0 |      5
         |      . |   2.25 |   3.37 |   0.00 |   5.62
         |      . |  40.00 |  60.00 |   0.00 |
         |      . |   5.56 |   6.82 |   0.00 |
---------+--------+--------+--------+--------+
251-500  |      4 |      3 |      6 |      1 |     10
         |      . |   3.37 |   6.74 |   1.12 |  11.24
         |      . |  30.00 |  60.00 |  10.00 |
         |      . |   8.33 |  13.64 |  11.11 |
---------+--------+--------+--------+--------+
501-1000 |      8 |      4 |      6 |      2 |     12
         |      . |   4.49 |   6.74 |   2.25 |  13.48
         |      . |  33.33 |  50.00 |  16.67 |
         |      . |  11.11 |  13.64 |  22.22 |
---------+--------+--------+--------+--------+
>1000    |     17 |     21 |     28 |      5 |     54
         |      . |  23.60 |  31.46 |   5.62 |  60.67
         |      . |  38.89 |  51.85 |   9.26 |
         |      . |  58.33 |  63.64 |  55.56 |
---------+--------+--------+--------+--------+
TOTAL           .       36       44        9       89
                .    40.45    49.44    10.11   100.00
```

Table 199. Number and percent of institutions having various total enrollments in science courses, by institutions with various percents of newly entering students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                               TABLE OF SCIENR BY NEWSKL4

SCIENR     TOTAL SCIENCE CLASSES ENROLLMENT     NEWSKL4     PERC NEW STUD WHO CAN

FREQUENCY|
PERCENT  |  Percent of Newly Entering Students with Ability to Program a Computer
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+
       . |      20|      26|      12|       0|       0|       0|       .
         |       .|       .|       .|       .|       .|       .|       .
         |       .|       .|       .|       .|       .|       .|
         |       .|       .|       .|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+
0-50     |       6|       1|       0|       1|       0|       0|       2
         |       .|    1.12|    0.00|    1.12|    0.00|    0.00|    2.25
         |       .|   50.00|    0.00|   50.00|    0.00|    0.00|
         |       .|    2.08|    0.00|   50.00|    0.00|    0.00|
---------+--------+--------+--------+--------+--------+--------+
51-100   |       8|       5|       1|       0|       0|       0|       6
         |       .|    5.62|    1.12|    0.00|    0.00|    0.00|    6.74
         |       .|   83.33|   16.67|    0.00|    0.00|    0.00|
         |       .|   10.42|    2.70|    0.00|    0.00|    0.00|
---------+--------+--------+--------+--------+--------+--------+
101-250  |      13|       2|       3|       0|       0|       0|       5
         |       .|    2.25|    3.37|    0.00|    0.00|    0.00|    5.62
         |       .|   40.00|   60.00|    0.00|    0.00|    0.00|
         |       .|    4.17|    8.11|    0.00|    0.00|    0.00|
---------+--------+--------+--------+--------+--------+--------+
251-500  |       4|       5|       4|       0|       1|       0|      10
         |       .|    5.62|    4.49|    0.00|    1.12|    0.00|   11.24
         |       .|   50.00|   40.00|    0.00|   10.00|    0.00|
         |       .|   10.42|   10.81|    0.00|  100.00|    0.00|
---------+--------+--------+--------+--------+--------+--------+
501-1000 |       8|       6|       6|       0|       0|       0|      12
         |       .|    6.74|    6.74|    0.00|    0.00|    0.00|   13.48
         |       .|   50.00|   50.00|    0.00|    0.00|    0.00|
         |       .|   12.50|   16.22|    0.00|    0.00|    0.00|
---------+--------+--------+--------+--------+--------+--------+
>1000    |      17|      29|      23|       1|       0|       1|      54
         |       .|   32.58|   25.84|    1.12|    0.00|    1.12|   60.67
         |       .|   53.70|   42.59|    1.85|    0.00|    1.85|
         |       .|   60.42|   62.16|   50.00|    0.00|  100.00|
---------+--------+--------+--------+--------+--------+--------+
TOTAL            .       48       37        2        1        1       89
                 .    53.93    41.57     2.25     1.12     1.12   100.00
```

Total Current Enrollment in Science Courses

Table 200. Number and percent of institutions having various total enrollments in science courses, by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

institutions in which fewer than 21 percent of newly entering students have the ability to program a computer, regardless of total enrollment category); 5) slightly negatively related to the percentage of currently enrolled students with no computer training or skills (See Table 201 and note the associated contingency coefficient of 0.50); 6) moderately positively related to the percentage of currently enrolled students with a general awareness of computers (See Table 202; the associated contingency coefficient is 0.45); 7) moderately positively related to the percentage of currently enrolled students with limited personal computer use and skill (Table 203; the contingency coefficient equals 0.42); 8) only slightly positively related to the percentage of currently enrolled students with the ability to program a computer (See Table 204; the associated contingency coefficient equals 0.41); 9) somewhat negatively related to the percentage of teaching faculty in science with no computer training or skills (See Table 205 and note the associated contingency coefficient of 0.46); 10) virtually unrelated to the percentage of teaching faculty in science with general awareness of computers (See Table 206); 11) virtually unrelated to the percentage of teaching faculty in science with limited personal computer use and skill (See Table 207 and note the associated contingency coefficient of 0.40); and 12) virtually unrelated to the percentage of teaching faculty in science with the ability to program a computer (See Table 208; the associated contingency coefficient is 0.44). Since almost two-thirds of the responding institutions had total current enrollments in science courses exceeding 1000, the strengths of the relationships reported in Tables 197 through 208 are attenuated by the marginal distribution of total current science enrollment.

Tables 209 through 220 illustrate relationships between academic vice presidents/deans reports on the number of enrolled science majors in their institutions and science department heads' reports on the computer training

FREQUENCY
PERCENT
ROW PCT
COL PCT

Percent of Currently Enrolled Stu[illegible]ts with No Computer Training or Skills

Total Current Enrollment in Science Courses

	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	10 . . .	8 . . .	4 . . .	3 . . .	6 . . .	7 . . .	. .
0-50	6 . . .	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.10 50.00 5.88	1 1.10 50.00 11.11	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 2.20
51-100	8 . . .	2 2.20 33.33 8.33	1 1.10 16.67 5.26	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.10 16.67 11.11	2 2.20 33.33 15.38	6 6.59
101-250	13 . . .	1 1.10 20.00 4.17	1 1.10 20.00 5.26	0 0.00 0.00 0.00	1 1.10 20.00 11.11	2 2.20 40.00 22.22	0 0.00 0.00 0.00	5 5.49
251-500	4 . . .	1 1.10 10.00 4.17	4 4.40 40.00 21.05	2 2.20 20.00 11.76	2 2.20 20.00 22.22	0 0.00 0.00 0.00	1 1.10 10.00 7.69	10 10.99
501-1000	8 . . .	2 2.20 16.67 8.33	1 1.10 8.33 5.26	4 4.40 33.33 23.53	1 1.10 8.33 11.11	0 0.00 0.00 0.00	4 4.40 33.33 30.77	12 13.19
>1000	15 . . .	18 19.78 32.14 75.00	12 13.19 21.43 63.16	10 10.99 17.86 58.82	4 4.40 7.14 44.44	6 6.59 10.71 66.67	6 6.59 10.71 46.15	56 61.54
TOTAL	. .	24 26.37	19 20.88	17 18.68	9 9.89	9 9.89	13 14.29	91 100.00

Table 201. Number and percent of institutions having various total enrollments in science courses, by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Currently Enrolled Students with General Awareness of Computers

Total Current Enrollment in Science Courses

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	8	16	5	5	3	1	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	6	1	1	0	0	0	0	2
	.	1.10	1.10	0.00	0.00	0.00	0.00	2.20
	.	50.00	50.00	0.00	0.00	0.00	0.00	
	.	6.25	3.23	0.00	0.00	0.00	0.00	
51-100	8	3	2	1	0	0	0	6
	.	3.30	2.20	1.10	0.00	0.00	0.00	6.59
	.	50.00	33.33	16.67	0.00	0.00	0.00	
	.	18.75	6.45	4.35	0.00	0.00	0.00	
101-250	13	1	2	1	0	1	0	5
	.	1.10	2.20	1.10	0.00	1.10	0.00	5.49
	.	20.00	40.00	20.00	0.00	20.00	0.00	
	.	6.25	6.45	4.35	0.00	12.50	0.00	
251-500	4	0	4	2	3	1	0	10
	.	0.00	4.40	2.20	3.30	1.10	0.00	10.99
	.	0.00	40.00	20.00	30.00	10.00	0.00	
	.	0.00	12.90	8.70	33.33	12.50	0.00	
501-1000	8	3	2	6	0	0	1	12
	.	3.30	2.20	6.59	0.00	0.00	1.10	13.19
	.	25.00	16.67	50.00	0.00	0.00	8.33	
	.	18.75	6.45	26.09	0.00	0.00	25.00	
>1000	15	8	20	13	6	6	3	56
	.	8.79	21.98	14.29	6.59	6.59	3.30	61.54
	.	14.29	35.71	23.21	10.71	10.71	5.36	
	.	50.00	64.52	56.52	66.67	75.00	75.00	
TOTAL	.	16	31	23	9	8	4	91
	.	17.58	34.07	25.27	9.89	8.79	4.40	100.00

Table 202 Number and percent of institutions having various total enrollments in science courses, by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Currently Enrolled Students with Limited Personal Computer Use and Skill							
Total Current Enrollment in Science Courses	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	9 . . .	21 . . .	3 . . .	2 . . .	1 . . .	2 . . .	. .
0-50	6 . . .	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.10 50.00 7.14	1 1.10 50.00 14.29	0 . . .	0 0.00 0.00 0.00	2 2.20
51-100	8 . . .	3 3.30 50.00 17.65	3 3.30 50.00 5.88	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 . . .	0 0.00 0.00 0.00	6 6.59
101-250	13 . . .	2 2.20 40.00 11.76	3 3.30 60.00 5.88	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 . . .	0 0.00 0.00 0.00	5 5.49
251-500	4 . . .	3 3.30 30.00 17.65	6 6.59 60.00 11.76	1 1.10 10.00 7.14	0 0.00 0.00 0.00	0 . . .	0 0.00 0.00 0.00	10 10.99
501-1000	8 . . .	2 2.20 16.67 11.76	6 6.59 50.00 11.76	3 3.30 25.00 21.43	1 1.10 8.33 14.29	0 . . .	0 0.00 0.00 0.00	12 13.19
>1000	15 . . .	7 7.69 12.50 41.18	33 36.26 58.93 64.71	9 9.89 16.07 64.29	5 5.49 8.93 71.43	0 . . .	2 2.20 3.57 100.00	56 61.54
TOTAL	. .	17 18.68	51 56.04	14 15.38	7 7.69	. .	2 2.20	91 100.00

Table 203. Number and percent of institutions having various total enrollments in science courses, by institutions with various percents of currently enrolled students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Currently Enrolled Students with Ability to Program a Computer

Total Current Enrollment in Science Courses

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	12	15	5	4	1	1	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	6	0	2	0	0	0	0	2
	.	0.00	2.20	0.00	0.00	0.00	0.00	2.20
	.	0.00	100.00	0.00	0.00	0.00	0.00	
	.	0.00	4.65	0.00	0.00	0.00	0.00	
51-100	8	3	1	1	1	0	0	6
	.	3.30	1.10	1.10	1.10	0.00	0.00	6.59
	.	50.00	16.67	16.67	16.67	0.00	0.00	
	.	13.64	2.33	9.09	14.29	0.00	0.00	
101-250	13	0	4	0	0	0	1	5
	.	0.00	4.40	0.00	0.00	0.00	1.10	5.49
	.	0.00	80.00	0.00	0.00	0.00	20.00	
	.	0.00	9.30	0.00	0.00	0.00	25.00	
251-500	4	3	4	1	1	1	0	10
	.	3.30	4.40	1.10	1.10	1.10	0.00	10.99
	.	30.00	40.00	10.00	10.00	10.00	0.00	
	.	13.64	9.30	9.09	14.29	25.00	0.00	
501-1000	8	3	6	3	0	0	0	12
	.	3.30	6.59	3.30	0.00	0.00	0.00	13.19
	.	25.00	50.00	25.00	0.00	0.00	0.00	
	.	13.64	13.95	27.27	0.00	0.00	0.00	
>1000	15	13	26	6	5	3	3	56
	.	14.29	28.57	6.59	5.49	3.30	3.30	61.54
	.	23.21	46.43	10.71	8.93	5.36	5.36	
	.	59.09	60.47	54.55	71.43	75.00	75.00	
TOTAL	.	22	43	11	7	4	4	91
	.	24.18	47.25	12.09	7.69	4.40	4.40	100.00

Table 204. Number and percent of institutions having various total enrollments in science courses, by institutions with various percents of currently enrolled students with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Faculty with No Computer Training or Skills

Total Current Enrollment in Science Courses

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	26 . . .	6 . . .	3 . . .	2 . . .	1 . . .	0 . . .	. .
0-50	6 . . .	1 1.08 50.00 1.79	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.08 50.00 16.67	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 2.15
51-100	8 . . .	3 3.23 50.00 5.36	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.08 16.67 16.67	1 1.08 16.67 20.00	1 1.08 16.67 25.00	6 6.45
101-250	13 . . .	3 3.23 60.00 5.36	1 1.08 20.00 9.09	1 1.08 20.00 9.09	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	5 5.38
251-500	4 . . .	8 8.60 80.00 14.29	1 1.08 10.00 9.09	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.08 10.00 20.00	0 0.00 0.00 0.00	10 10.75
501-1000	7 . . .	5 5.38 38.46 8.93	2 2.15 15.38 18.18	4 4.30 30.77 36.36	0 0.00 0.00 0.00	1 1.08 7.69 20.00	1 1.08 7.69 25.00	13 13.98
>1000	14 . . .	36 38.71 63.16 64.29	7 7.53 12.28 63.64	6 6.45 10.53 54.55	4 4.30 7.02 66.67	2 2.15 3.51 40.00	2 2.15 3.51 50.00	57 61.29
TOTAL	. .	56 60.22	11 11.83	11 11.83	6 6.45	5 5.38	4 4.30	93 100.00

Table 205. Number and percent of institutions having various total enrollments in science courses, by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Faculty with General Awareness of Computers

Total Current Enrollment in Science Courses

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	15 . . .	4 . . .	7 . . .	3 . . .	7 . . .	2 . . .	. .
0-50	6 . . .	1 1.08 50.00 5.00	0 0.00 0.00 0.00	1 1.08 50.00 4.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 2.15
51-100	8 . . .	3 3.23 50.00 15.00	0 0.00 0.00 0.00	2 2.15 33.33 8.00	1 1.08 16.67 6.25	0 0.00 0.00 0.00	0 0.00 0.00 0.00	6 6.45
101-250	13 . . .	1 1.08 20.00 5.00	1 1.08 20.00 4.17	1 1.08 20.00 4.00	1 1.08 20.00 6.25	1 1.08 20.00 14.29	0 0.00 0.00 0.00	5 5.38
251-500	4 . . .	0 0.00 0.00 0.00	4 4.30 40.00 16.67	1 1.08 10.00 4.00	2 2.15 20.00 12.50	3 3.23 30.00 42.86	0 0.00 0.00 0.00	10 10.75
501-1000	7 . . .	1 1.08 7.69 5.00	5 5.38 38.46 20.83	3 3.23 23.08 12.00	4 4.30 30.77 25.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	13 13.98
>1000	14 . . .	14 15.05 24.56 70.00	14 15.05 24.56 58.33	17 18.28 29.82 68.00	8 8.60 14.04 50.00	3 3.23 5.26 42.86	1 1.08 1.75 100.00	57 61.29
TOTAL	. .	20 21.51	24 25.81	25 26.88	16 17.20	7 7.53	1 1.08	93 100.00

Table 206. Number and percent of institutions having various total enrollments in science courses, by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
 FREQUENCY|
 PERCENT  |        Percent of Faculty with Li[illegible]ed Personal Computer Use and Skill
 ROW PCT  |
 COL PCT  |
          |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
 ---------+--------+--------+--------+--------+--------+--------+--------+
        . |      20 |      8 |     18 |      5 |      5 |      0 |      2 |     .
          |       . |      . |      . |      . |      . |      . |      . |     .
          |       . |      . |      . |      . |      . |      . |      . |
          |       . |      . |      . |      . |      . |      . |      . |
 ---------+--------+--------+--------+--------+--------+--------+--------+
 0-50     |       6 |      1 |      1 |      0 |      0 |      0 |      0 |     2
          |       . |   1.08 |   1.08 |   0.00 |   0.00 |   0.00 |   0.00 |  2.15
          |       . |  50.00 |  50.00 |   0.00 |   0.00 |   0.00 |   0.00 |
          |       . |   5.56 |   2.86 |   0.00 |   0.00 |   0.00 |   0.00 |
 ---------+--------+--------+--------+--------+--------+--------+--------+
 51-100   |       8 |      3 |      1 |      1 |      1 |      0 |      0 |     6
          |       . |   3.23 |   1.08 |   1.08 |   1.08 |   0.00 |   0.00 |  6.45
          |       . |  50.00 |  16.67 |  16.67 |  16.67 |   0.00 |   0.00 |
          |       . |  16.67 |   2.86 |   4.17 |   9.09 |   0.00 |   0.00 |
 ---------+--------+--------+--------+--------+--------+--------+--------+
 101-250  |      13 |      2 |      2 |      0 |      1 |      0 |      0 |     5
          |       . |   2.15 |   2.15 |   0.00 |   1.08 |   0.00 |   0.00 |  5.38
          |       . |  40.00 |  40.00 |   0.00 |  20.00 |   0.00 |   0.00 |
          |       . |  11.11 |   5.71 |   0.00 |   9.09 |   0.00 |   0.00 |
 ---------+--------+--------+--------+--------+--------+--------+--------+
 251-500  |       4 |      0 |      6 |      3 |      0 |      1 |      0 |    10
          |       . |   0.00 |   6.45 |   3.23 |   0.00 |   1.08 |   0.00 | 10.75
          |       . |   0.00 |  60.00 |  30.00 |   0.00 |  10.00 |   0.00 |
          |       . |   0.00 |  17.14 |  12.50 |   0.00 |  25.00 |   0.00 |
 ---------+--------+--------+--------+--------+--------+--------+--------+
 501-1000 |       7 |      1 |      6 |      4 |      1 |      1 |      0 |    13
          |       . |   1.08 |   6.45 |   4.30 |   1.08 |   1.08 |   0.00 | 13.98
          |       . |   7.69 |  46.15 |  30.77 |   7.69 |   7.69 |   0.00 |
          |       . |   5.56 |  17.14 |  16.67 |   9.09 |  25.00 |   0.00 |
 ---------+--------+--------+--------+--------+--------+--------+--------+
 >1000    |      14 |     11 |     19 |     16 |      8 |      2 |      1 |    57
          |       . |  11.83 |  20.43 |  17.20 |   8.60 |   2.15 |   1.08 | 61.29
          |       . |  19.30 |  33.33 |  28.07 |  14.04 |   3.51 |   1.75 |
          |       . |  61.11 |  54.29 |  66.67 |  72.73 |  50.00 | 100.00 |
 ---------+--------+--------+--------+--------+--------+--------+--------+
 TOTAL            .       18       35       24       11        4        1      93
                  .    19.35    37.63    25.81    11.83     4.30     1.08  100.00
```

Total Current Enrollment in Science Courses

Table 207. Number and percent of institutions having various total enrollments in science courses, by institutions with various percents of faculty with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Total Current Enrollment in Science Courses	Percent of Faculty with Ability to Program a Computer							
FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	7 . . .	9 . . .	6 . . .	7 . . .	3 . . .	6 . . .	. .
0-50	6 . . .	0 0.00 0.00 0.00	1 1.08 50.00 3.57	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.08 50.00 8.33	2 2.15
51-100	8 . . .	3 3.23 50.00 25.00	0 0.00 0.00 0.00	1 1.08 16.67 3.85	1 1.08 16.67 9.09	0 0.00 0.00 0.00	1 1.08 16.67 8.33	6 6.45
101-250	13 . . .	0 0.00 0.00 0.00	1 1.08 20.00 3.57	2 2.15 40.00 7.69	1 1.08 20.00 9.09	0 0.00 0.00 0.00	1 1.08 20.00 8.33	5 5.38
251-500	4 . . .	1 1.08 10.00 8.33	4 4.30 40.00 14.29	4 4.30 40.00 15.38	0 0.00 0.00 0.00	1 1.08 10.00 25.00	0 0.00 0.00 0.00	10 10.75
501-1000	7 . . .	3 3.23 23.08 25.00	5 5.38 38.46 17.86	3 3.23 23.08 11.54	1 1.08 7.69 9.09	0 0.00 0.00 0.00	1 1.08 7.69 8.33	13 13.98
>1000	14 . . .	5 5.38 8.77 41.67	17 18.28 29.82 60.71	16 17.20 28.07 61.54	8 8.60 14.04 72.73	3 3.23 5.26 75.00	8 8.60 14.04 66.67	57 61.29
TOTAL	. .	12 12.90	28 30.11	26 27.96	11 11.83	4 4.30	12 12.90	93 100.00

Table 208. Number and percent of institutions having various total enrollments in science courses, by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

and skills of newly entering students, currently enrolled students, and teaching faculty in their departments. Relationships between the number of enrolled science majors and the reported computing skills and training of newly entering students are shown in Tables 209 through 212. In summary, the number of enrolled science majors is 1) moderately related in a negative direction to the percent of newly entering students with no computer training or skills (Table 209; the contingency coefficient equals 0.47); 2) moderately related in a positive direction to the percentage of newly enrolled students with general awareness of computers (See Table 210; the contingency coefficient equals 0.51); 3) slightly positively related to the percentage of newly enrolled students with limited personal computer use and skill (Table 211; the contingency coefficient equals 0.36); and 4) slightly positively related to the percentage of newly entering students with the ability to program a computer (See Table 212 and note its associated contingency coefficient of 0.36).

Tables 213 through 216 illustrate relationships between the number of enrolled science majors and the computer training and skills of currently enrolled students. These relationships can be summarized as: 1) the percentage of students with no computer training or skills tends to be higher in institutions with fewer enrolled science majors (See Table 213, and note the contingency coefficient of 0.52); 2) the percentage of currently enrolled students with general awareness of computers tends to be somewhat higher in institutions with a larger number of enrolled science majors, but some institutions with relatively few science majors have large percentages of enrolled students with general awareness of computers (See Table 214; the contingency coefficient is 0.55); 3) there is a moderate tendency for institutions with larger numbers of enrolled science majors to have higher percentages of currently enrolled students with limited personal computer use and skill

Percent of Newly Entering Students with No Computer Training or Skills

Number of Enrolled Science Majors FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	5	6	3	3	5	16	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	24	0	2	1	0	0	4	7
	.	0.00	2.25	1.12	0.00	0.00	4.49	7.87
	.	0.00	28.57	14.29	0.00	0.00	57.14	
	.	0.00	13.33	12.50	0.00	0.00	11.43	
51-100	9	0	0	0	1	2	5	8
	.	0.00	0.00	0.00	1.12	2.25	5.62	8.99
	.	0.00	0.00	0.00	12.50	25.00	62.50	
	.	0.00	0.00	0.00	16.67	15.38	14.29	
101-250	3	2	3	2	1	2	11	21
	.	2.25	3.37	2.25	1.12	2.25	12.36	23.60
	.	9.52	14.29	9.52	4.76	9.52	52.38	
	.	16.67	20.00	25.00	16.67	15.38	31.43	
251-500	12	2	3	4	1	5	8	23
	.	2.25	3.37	4.49	1.12	5.62	8.99	25.84
	.	8.70	13.04	17.39	4.35	21.74	34.78	
	.	16.67	20.00	50.00	16.67	38.46	22.86	
501-1000	2	3	3	1	1	0	3	11
	.	3.37	3.37	1.12	1.12	0.00	3.37	12.36
	.	27.27	27.27	9.09	9.09	0.00	27.27	
	.	25.00	20.00	12.50	16.67	0.00	8.57	
>1000	6	5	4	0	2	4	4	19
	.	5.62	4.49	0.00	2.25	4.49	4.49	21.35
	.	26.32	21.05	0.00	10.53	21.05	21.05	
	.	41.67	26.67	0.00	33.33	30.77	11.43	
TOTAL	.	12	15	8	6	13	35	89
	.	13.48	16.85	8.99	6.74	14.61	39.33	100.00

Table 209. Number and percent of institutions having various total numbers of science majors, by institutions with various percents of newly entering students with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Newly Entering Students with General Awareness of Computers

Number of Enrolled Science Majors

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	9	13	3	4	3	6	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	24	3	1	0	0	1	2	7
	.	3.37	1.12	0.00	0.00	1.12	2.25	7.87
	.	42.86	14.29	0.00	0.00	14.29	28.57	
	.	17.65	3.03	0.00	0.00	14.29	14.29	
51-100	9	1	6	0	1	0	0	8
	.	1.12	6.74	0.00	1.12	0.00	0.00	8.99
	.	12.50	75.00	0.00	12.50	0.00	0.00	
	.	5.88	18.18	0.00	11.11	0.00	0.00	
101-250	3	6	7	1	2	1	4	21
	.	6.74	7.87	1.12	2.25	1.12	4.49	23.60
	.	28.57	33.33	4.76	9.52	4.76	19.05	
	.	35.29	21.21	11.11	22.22	14.29	28.57	
251-500	12	2	11	4	3	3	0	23
	.	2.25	12.36	4.49	3.37	3.37	0.00	25.84
	.	8.70	47.83	17.39	13.04	13.04	0.00	
	.	11.76	33.33	44.44	33.33	42.86	0.00	
501-1000	2	1	2	2	1	0	5	11
	.	1.12	2.25	2.25	1.12	0.00	5.62	12.36
	.	9.09	18.18	18.18	9.09	0.00	45.45	
	.	5.88	6.06	22.22	11.11	0.00	35.71	
>1000	6	4	6	2	2	2	3	19
	.	4.49	6.74	2.25	2.25	2.25	3.37	21.35
	.	21.05	31.58	10.53	10.53	10.53	15.79	
	.	23.53	18.18	22.22	22.22	28.57	21.43	
TOTAL	.	17	33	9	9	7	14	89
	.	19.10	37.08	10.11	10.11	7.87	15.73	100.00

Table 210. Number and percent of institutions having various total numbers of science majors, by institutions with various percents of newly entering students with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                     TABLE OF ENRMAJ BY NEWSKL3

ENRMAJ    NUMBER SCIENCE MAJORS ENROLLED    NEWSKL3    PERC NEW STUD LI

FREQUENCY|      Percent of Newly Entering Students with
PERCENT  |      Limited Personal Computer Use and Skill
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |  TOTAL
---------+--------+--------+--------+--------+
       . |      20|      17|      19|       2|       .
         |       .|       .|       .|       .|       .
         |       .|       .|       .|       .|
         |       .|       .|       .|       .|
---------+--------+--------+--------+--------+
0-50     |      24|       4|       3|       0|       7
         |       .|    4.49|    3.37|    0.00|    7.87
         |       .|   57.14|   42.86|    0.00|
         |       .|   11.11|    6.82|    0.00|
---------+--------+--------+--------+--------+
51-100   |       9|       4|       4|       0|       8
         |       .|    4.49|    4.49|    0.00|    8.99
         |       .|   50.00|   50.00|    0.00|
         |       .|   11.11|    9.09|    0.00|
---------+--------+--------+--------+--------+
101-250  |       3|      12|       9|       0|      21
         |       .|   13.48|   10.11|    0.00|   23.60
         |       .|   57.14|   42.86|    0.00|
         |       .|   33.33|   20.45|    0.00|
---------+--------+--------+--------+--------+
251-500  |      12|       5|      13|       5|      23
         |       .|    5.62|   14.61|    5.62|   25.84
         |       .|   21.74|   56.52|   21.74|
         |       .|   13.89|   29.55|   55.56|
---------+--------+--------+--------+--------+
501-1000 |       2|       5|       4|       2|      11
         |       .|    5.62|    4.49|    2.25|   12.36
         |       .|   45.45|   36.36|   18.18|
         |       .|   13.89|    9.09|   22.22|
---------+--------+--------+--------+--------+
>1000    |       6|       6|      11|       2|      19
         |       .|    6.74|   12.36|    2.25|   21.35
         |       .|   31.58|   57.89|   10.53|
         |       .|   16.67|   25.00|   22.22|
---------+--------+--------+--------+--------+
TOTAL            .      36       44        9       89
                 .   40.45    49.44    10.11   100.00
```

Number of Enrolled Science Majors

Table 211. Number and percent of institutions having various total numbers of science majors, by institutions with various percents of newly entering students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Enrolled Science Majors

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Newly Entering Students with Ability to Program a Computer .	0	1%-20%	21%-40%	41%-60%	81%-100%	TOTAL
.	20 . . .	26 . . .	12 . . .	0 . . .	0 . . .	0 . . .	. .
0-50	24 . . .	5 5.62 71.43 10.42	2 2.25 28.57 5.41	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	7 7.87
51-100	9 . . .	4 4.49 50.00 8.33	4 4.49 50.00 10.81	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	8 8.99
101-250	3 . . .	15 16.85 71.43 31.25	6 6.74 28.57 16.22	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	21 23.60
251-500	12 . . .	11 12.36 47.83 22.92	10 11.24 43.48 27.03	1 1.12 4.35 50.00	1 1.12 4.35 100.00	0 0.00 0.00 0.00	23 25.84
501-1000	2 . . .	6 6.74 54.55 12.50	5 5.62 45.45 13.51	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	11 12.36
>1000	6 . . .	7 7.87 36.84 14.58	10 11.24 52.63 27.03	1 1.12 5.26 50.00	0 0.00 0.00 0.00	1 1.12 5.26 100.00	19 21.35
TOTAL	. .	48 53.93	37 41.57	2 2.25	1 1.12	1 1.12	89 100.00

Table 212. Number and percent of institutions having various total numbers of science majors, by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Currently Enrolled Students with No Computer Training or Skills

Number of Enrolled Science Majors

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	10	8	4	3	6	7	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	24	0	2	2	1	1	1	7
	.	0.00	2.20	2.20	1.10	1.10	1.10	7.69
	.	0.00	28.57	28.57	14.29	14.29	14.29	
	.	0.00	10.53	11.76	11.11	11.11	7.69	
51-100	9	2	1	0	1	3	1	8
	.	2.20	1.10	0.00	1.10	3.30	1.10	8.79
	.	25.00	12.50	0.00	12.50	37.50	12.50	
	.	8.33	5.26	0.00	11.11	33.33	7.69	
101-250	3	6	2	4	1	2	6	21
	.	6.59	2.20	4.40	1.10	2.20	6.59	23.08
	.	28.57	9.52	19.05	4.76	9.52	28.57	
	.	25.00	10.53	23.53	11.11	22.22	46.15	
251-500	12	3	6	5	5	0	4	23
	.	3.30	6.59	5.49	5.49	0.00	4.40	25.27
	.	13.04	26.09	21.74	21.74	0.00	17.39	
	.	12.50	31.58	29.41	55.56	0.00	30.77	
501-1000	2	6	2	2	1	0	0	11
	.	6.59	2.20	2.20	1.10	0.00	0.00	12.09
	.	54.55	18.18	18.18	9.09	0.00	0.00	
	.	25.00	10.53	11.76	11.11	0.00	0.00	
>1000	4	7	6	4	0	3	1	21
	.	7.69	6.59	4.40	0.00	3.30	1.10	23.08
	.	33.33	28.57	19.05	0.00	14.29	4.76	
	.	29.17	31.58	23.53	0.00	33.33	7.69	
TOTAL	.	24	19	17	9	9	13	91
	.	26.37	20.88	18.68	9.89	9.89	14.29	100.00

Table 213. Number and percent of institutions having various total numbers of science majors, by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

415

416

Percent of Currently Enrolled Students with General Awareness of Computers

Number of Enrolled Science Majors

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	8	16	5	5	3	1	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	24	2	1	1	0	3	0	7
	.	2.20	1.10	1.10	0.00	3.30	0.00	7.69
	.	28.57	14.29	14.29	0.00	42.86	0.00	
	.	12.50	3.23	4.35	0.00	37.50	0.00	
51-100	9	3	4	1	0	0	0	8
	.	3.30	4.40	1.10	0.00	0.00	0.00	8.79
	.	37.50	50.00	12.50	0.00	0.00	0.00	
	.	18.75	12.90	4.35	0.00	0.00	0.00	
101-250	3	3	7	7	2	0	2	21
	.	3.30	7.69	7.69	2.20	0.00	2.20	23.08
	.	14.29	33.33	33.33	9.52	0.00	9.52	
	.	18.75	22.58	30.43	22.22	0.00	50.00	
251-500	12	2	12	6	3	0	0	23
	.	2.20	13.19	6.59	3.30	0.00	0.00	25.27
	.	8.70	52.17	26.09	13.04	0.00	0.00	
	.	12.50	38.71	26.09	33.33	0.00	0.00	
501-1000	2	1	3	3	0	2	2	11
	.	1.10	3.30	3.30	0.00	2.20	2.20	12.09
	.	9.09	27.27	27.27	0.00	18.18	18.18	
	.	6.25	9.68	13.04	0.00	25.00	50.00	
>1000	4	5	4	5	4	3	0	21
	.	5.49	4.40	5.49	4.40	3.30	0.00	23.08
	.	23.81	19.05	23.81	19.05	14.29	0.00	
	.	31.25	12.90	21.74	44.44	37.50	0.00	
TOTAL	.	16	31	23	9	8	4	91
	.	17.58	34.07	25.27	9.89	8.79	4.40	100.00

Table 214. Number and percent of institutions having various total numbers of science majors by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

(Table 215; the contingency coefficient equals 0.47); and 4) the percentage of currently enrolled students with the ability to program a computer tends to be somewhat higher in institutions with larger numbers of enrolled science majors (See Table 216; the contingency coefficient equals 0.47).

Relationships between the number of enrolled science majors and the computer training and skills of faculty in the sciences are illustrated in Tables 217 through 220. To summarize, the number of enrolled science majors in a minority higher education institution appears to be 1) virtually unrelated to the percentage of faculty with no computer training or skills (See Table 217; the contingency coefficient equals 0.47; 2) inconsistently related to the percentage of science faculty with general awareness of computers, with some tendency to bimodality in the distributions across numbers of enrolled majors (See Table 218 and note the contingency coefficient of 0.50); 3) moderately positively related to the percent of science faculty with limited personal computer use and skill (See Table 219; the contingency coefficient is 0.46); and 4) somewhat positively related to the percentage of science faculty with the ability to program a computer (See Table 220; the contingency coefficient equals 0.49).

C. Relationships Between Courses and Students in the Sciences, and Science Faculty Use of Computers

The relationships examined in this section bear on the general question, do science faculty tend to make greater use of academic computing when they are affiliated with institutions that have larger programs in the sciences, as reflected by more diverse course offerings and greater science enrollments? Academic vice presidents/deans reports on the number of differenct science courses offered in their institutions during the 1978-79 academic year, the total current enrollments in science courses in their institutions, and the

Number of Enrolled Science Majors

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Currently Enrolled Students with Limited Personal Computer Use and Skill							
	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	9 . . .	21 . . .	3 . . .	2 . . .	1 . . .	2 . . .	. .
0-50	24 . . .	2 2.20 28.57 11.76	4 4.40 57.14 7.84	0 0.00 0.00 0.00	1 1.10 14.29 14.29	0 . . .	0 0.00 0.00 0.00	7 7.69
51-100	9 . . .	4 4.40 50.00 23.53	4 4.40 50.00 7.84	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 . . .	0 0.00 0.00 0.00	8 8.79
101-250	3 . . .	5 5.49 23.81 29.41	12 13.19 57.14 23.53	1 1.10 4.76 7.14	2 2.20 9.52 28.57	0 . . .	1 1.10 4.76 50.00	21 23.08
251-500	12 . . .	2 2.20 8.70 11.76	13 14.29 56.52 25.49	8 8.79 34.78 57.14	0 0.00 0.00 0.00	0 . . .	0 0.00 0.00 0.00	23 25.27
501-1000	2 . . .	1 1.10 9.09 5.88	5 5.49 45.45 9.80	2 2.20 18.18 14.29	2 2.20 18.18 28.57	0 . . .	1 1.10 9.09 50.00	11 12.09
>1000	4 . . .	3 3.30 14.29 17.65	13 14.29 61.90 25.49	3 3.30 14.29 21.43	2 2.20 9.52 28.57	0 . . .	0 0.00 0.00 0.00	21 23.08
TOTAL	. .	17 18.68	51 56.04	14 15.38	7 7.69	. .	2 2.20	91 100.00

Table 215. Number and percent of institutions having various total numbers of science majors, by institutions with various percents of currently enrolled students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Currently Enrolled Students with Ability to Program a Computer

Number of Enrolled Science Majors

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	12	15	5	4	1	1	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	24	3	4	0	0	0	0	7
	.	3.30	4.40	0.00	0.00	0.00	0.00	7.69
	.	42.86	57.14	0.00	0.00	0.00	0.00	
	.	13.64	9.30	0.00	0.00	0.00	0.00	
51-100	9	2	4	0	1	0	1	8
	.	2.20	4.40	0.00	1.10	0.00	1.10	8.79
	.	25.00	50.00	0.00	12.50	0.00	12.50	
	.	9.09	9.30	0.00	14.29	0.00	25.00	
101-250	3	8	10	3	0	0	0	21
	.	8.79	10.99	3.30	0.00	0.00	0.00	23.08
	.	38.10	47.62	14.29	0.00	0.00	0.00	
	.	36.36	23.26	27.27	0.00	0.00	0.00	
251-500	12	4	8	5	4	2	0	23
	.	4.40	8.79	5.49	4.40	2.20	0.00	25.27
	.	17.39	34.78	21.74	17.39	8.70	0.00	
	.	18.18	18.60	45.45	57.14	50.00	0.00	
501-1000	2	2	6	1	1	1	0	11
	.	2.20	6.59	1.10	1.10	1.10	0.00	12.09
	.	18.18	54.55	9.09	9.09	9.09	0.00	
	.	9.09	13.95	9.09	14.29	25.00	0.00	
>1000	4	3	11	2	1	1	3	21
	.	3.30	12.09	2.20	1.10	1.10	3.30	23.08
	.	14.29	52.38	9.52	4.76	4.76	14.29	
	.	13.64	25.58	18.18	14.29	25.00	75.00	
TOTAL	.	22	43	11	7	4	4	91
	.	24.18	47.25	12.09	7.69	4.40	4.40	100.00

Table 216. Number and percent of institutions having various total numbers of science majors, by institutions with various percents of currently enrolled students with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
FREQUENCY|
PERCENT  |
ROW PCT  |          Percent of Faculty [illegible]h No Computer Training or Skills
COL PCT  |
         |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|   TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     20 |     26 |      6 |      3 |      2 |      1 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |     24 |      5 |      1 |      0 |      1 |      0 |      0 |      7
         |      . |   5.38 |   1.08 |   0.00 |   1.08 |   0.00 |   0.00 |   7.53
         |      . |  71.43 |  14.29 |   0.00 |  14.29 |   0.00 |   0.00 |
         |      . |   8.93 |   9.09 |   0.00 |  16.67 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      9 |      4 |      1 |      1 |      0 |      1 |      1 |      8
         |      . |   4.30 |   1.08 |   1.08 |   0.00 |   1.08 |   1.08 |   8.60
         |      . |  50.00 |  12.50 |  12.50 |   0.00 |  12.50 |  12.50 |
         |      . |   7.14 |   9.09 |   9.09 |   0.00 |  20.00 |  25.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      3 |     11 |      4 |      3 |      0 |      3 |      0 |     21
         |      . |  11.83 |   4.30 |   3.23 |   0.00 |   3.23 |   0.00 |  22.58
         |      . |  52.38 |  19.05 |  14.29 |   0.00 |  14.29 |   0.00 |
         |      . |  19.64 |  36.36 |  27.27 |   0.00 |  60.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |     11 |     14 |      2 |      3 |      2 |      0 |      3 |     24
         |      . |  15.05 |   2.15 |   3.23 |   2.15 |   0.00 |   3.23 |  25.81
         |      . |  58.33 |   8.33 |  12.50 |   8.33 |   0.00 |  12.50 |
         |      . |  25.00 |  18.18 |  27.27 |  33.33 |   0.00 |  75.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
501-1000 |      2 |      9 |      2 |      0 |      0 |      0 |      0 |     11
         |      . |   9.68 |   2.15 |   0.00 |   0.00 |   0.00 |   0.00 |  11.83
         |      . |  81.82 |  18.18 |   0.00 |   0.00 |   0.00 |   0.00 |
         |      . |  16.07 |  18.18 |   0.00 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      3 |     13 |      1 |      4 |      3 |      1 |      0 |     22
         |      . |  13.98 |   1.08 |   4.30 |   3.23 |   1.08 |   0.00 |  23.66
         |      . |  59.09 |   4.55 |  18.18 |  13.64 |   4.55 |   0.00 |
         |      . |  23.21 |   9.09 |  36.36 |  50.00 |  20.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       56       11       11        6        5        4       93
                .    60.22    11.83    11.83     6.45     5.38     4.30   100.00
```

Number of Enrolled Science Majors

Table 217. Number and percent of institutions having various total numbers of science majors, by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Enrolled Science Majors

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Faculty with General Awareness of Computers							
	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	15	4	7	3	7	2	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	24	4	0	0	2	1	0	7
	.	4.30	0.00	0.00	2.15	1.08	0.00	7.53
	.	57.14	0.00	0.00	28.57	14.29	0.00	
	.	20.00	0.00	0.00	12.50	14.29	0.00	
51-100	9	1	2	3	1	1	0	8
	.	1.08	2.15	3.23	1.08	1.08	0.00	8.60
	.	12.50	25.00	37.50	12.50	12.50	0.00	
	.	5.00	8.33	12.00	6.25	14.29	0.00	
101-250	3	2	8	5	3	2	1	21
	.	2.15	8.60	5.38	3.23	2.15	1.08	22.58
	.	9.52	38.10	23.81	14.29	9.52	4.76	
	.	10.00	33.33	20.00	18.75	28.57	100.00	
251-500	11	4	8	7	3	2	0	24
	.	4.30	8.60	7.53	3.23	2.15	0.00	25.81
	.	16.67	33.33	29.17	12.50	8.33	0.00	
	.	20.00	33.33	28.00	18.75	28.57	0.00	
501-1000	2	6	1	4	0	0	0	11
	.	6.45	1.08	4.30	0.00	0.00	0.00	11.83
	.	54.55	9.09	36.36	0.00	0.00	0.00	
	.	30.00	4.17	16.00	0.00	0.00	0.00	
>1000	3	3	5	6	7	1	0	22
	.	3.23	5.38	6.45	7.53	1.08	0.00	23.66
	.	13.64	22.73	27.27	31.82	4.55	0.00	
	.	15.00	20.83	24.00	43.75	14.29	0.00	
TOTAL	.	20	24	25	16	7	1	93
	.	21.51	25.81	26.88	17.20	7.53	1.08	100.00

Table 218 . Number and percent of institutions having various total numbers of science majors, by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Faculty with Limited Personal Computer Use and Skill

Number of Enrolled Science Majors

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	8 . . .	18 . . .	5 . . .	5 . . .	0 . . .	2 . . .	. .
0-50	24 . . .	3 3.23 42.86 16.67	2 2.15 28.57 5.71	1 1.08 14.29 4.17	1 1.08 14.29 9.09	0 0.00 0.00 0.00	0 0.00 0.00 0.00	7 7.53
51-100	9 . . .	3 3.23 37.50 16.67	4 4.30 50.00 11.43	0 0.00 0.00 0.00	1 1.08 12.50 9.09	0 0.00 0.00 0.00	0 0.00 0.00 0.00	8 8.60
101-250	3 . . .	3 3.23 14.29 16.67	10 10.75 47.62 28.57	5 5.38 23.81 20.83	2 2.15 9.52 18.18	1 1.08 4.76 25.00	0 0.00 0.00 0.00	21 22.58
251-500	11 . . .	4 4.30 16.67 22.22	9 9.68 37.50 25.71	8 8.60 33.33 33.33	1 1.08 4.17 9.09	2 2.15 8.33 50.00	0 0.00 0.00 0.00	24 25.81
501-1000	2 . . .	2 2.15 18.18 11.11	1 1.08 9.09 2.86	3 3.23 27.27 12.50	3 3.23 27.27 27.27	1 1.08 9.09 25.00	1 1.08 9.09 100.00	11 11.83
>1000	3 . . .	3 3.23 13.64 16.67	9 9.68 40.91 25.71	7 7.53 31.82 29.17	3 3.23 13.64 27.27	0 0.00 0.00 0.00	0 0.00 0.00 0.00	22 23.66
TOTAL	. .	18 19.35	35 37.63	24 25.81	11 11.83	4 4.30	1 1.08	93 100.00

Table 219. Number and percent of institutions having various total numbers of science majors, by institutions with various percents of faculty with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Faculty with Ability to Program a Computer

Number of Enrolled Science Majors

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	7	9	6	7	3	6	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	24	1	2	1	0	0	3	7
	.	1.08	2.15	1.08	0.00	0.00	3.23	7.53
	.	14.29	28.57	14.29	0.00	0.00	42.86	
	.	8.33	7.14	3.85	0.00	0.00	25.00	
51-100	9	2	1	2	3	0	0	8
	.	2.15	1.08	2.15	3.23	0.00	0.00	8.60
	.	25.00	12.50	25.00	37.50	0.00	0.00	
	.	16.67	3.57	7.69	27.27	0.00	0.00	
101-250	3	4	7	6	1	1	2	21
	.	4.30	7.53	6.45	1.08	1.08	2.15	22.58
	.	19.05	33.33	28.57	4.76	4.76	9.52	
	.	33.33	25.00	23.08	9.09	25.00	16.67	
251-500	11	3	10	4	2	2	3	24
	.	3.23	10.75	4.30	2.15	2.15	3.23	25.81
	.	12.50	41.67	16.67	8.33	8.33	12.50	
	.	25.00	35.71	15.38	18.18	50.00	25.00	
501-1000	2	1	0	5	3	0	2	11
	.	1.08	0.00	5.38	3.23	0.00	2.15	11.83
	.	9.09	0.00	45.45	27.27	0.00	18.18	
	.	8.33	0.00	19.23	27.27	0.00	16.67	
>1000	3	1	8	8	2	1	2	22
	.	1.08	8.60	8.60	2.15	1.08	2.15	23.66
	.	4.55	36.36	36.36	9.09	4.55	9.09	
	.	8.33	28.57	30.77	18.18	25.00	16.67	
TOTAL	.	12	28	26	11	4	12	93
	.	12.90	30.11	27.96	11.83	4.30	12.90	100.00

Table 220. Number and percent of institutions having various total numbers of science majors, by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

number of enrolled science majors in their institutions are related to reports by heads of science departments on the percentages of their teaching faculty who use computers for each of four academic purposes. These relationships are shown in Tables 221 through 232.

Tables 221 through 224 illustrate relationships between the number of different science courses offered by a minority institution during the 1978-79 academic year, and science faculty use of academic computing. It appears that the number of different science courses an institution offered, 1) has virtually no relationship to the percentage of science faculty who use computers for administrative purposes in conjunction with their classes (See Table 224); 2) is somewhat positively related to the percentage of science faculty who use computers for facilitating instruction in their classes (See Table 221; the contingency coefficient equals 0.55); 3) is slightly positively related to the percentage of science faculty who use computers as a tool in their research (See Table 222; the contingency coefficient equals 0.51); and 4) is somewhat positively related to the percentage of faculty who use computers for games or experimentation (See Table 223; the contingency coefficient equals 0.64).

Total current enrollment in science courses is related to reported science faculty use of computers for various academic purposes in Tables 224 through 228. When total science enrollments are higher, it appears that 1) there is no apparent tendency for the percentage of science faculty who use computers for administrative purposes in their classes to be greater (Table 225; the contingency coefficient equals 0.49); 2) there is a very slight tendency for the percentage of science faculty who use computers for facilitating instruction in their classes to be smaller (See Table 226), and collapse categories of enrollments of 500 or less.); 3) there is a slight tendency for the percentage of faculty who use computers as a tool in their own research to be

Number of Different Science Courses Offered 1978-79

```
FREQUENCY|
PERCENT  |      Percent of Faculty Having Access to Computers for Administrative Purposes
ROW PCT  |
COL PCT  |        .|        0|1%-20%   |21%-40%  |41%-60%  |61%-80%  |81%-100%|  TOTAL
---------+---------+---------+---------+---------+---------+---------+---------+
   .     |      25 |      18 |       7 |       4 |       4 |       1 |       0 |       .
         |       . |       . |       . |       . |       . |       . |       . |       .
         |       . |       . |       . |       . |       . |       . |       . |
         |       . |       . |       . |       . |       . |       . |       . |
---------+---------+---------+---------+---------+---------+---------+---------+
0-5      |      11 |       1 |       0 |       0 |       0 |       0 |       1 |       2
         |       . |    1.25 |    0.00 |    0.00 |    0.00 |    0.00 |    1.25 |    2.50
         |       . |   50.00 |    0.00 |    0.00 |    0.00 |    0.00 |   50.00 |
         |       . |    3.13 |    0.00 |    0.00 |    0.00 |    0.00 |   20.00 |
---------+---------+---------+---------+---------+---------+---------+---------+
6-10     |      13 |       0 |       1 |       0 |       0 |       0 |       1 |       2
         |       . |    0.00 |    1.25 |    0.00 |    0.00 |    0.00 |    1.25 |    2.50
         |       . |    0.00 |   50.00 |    0.00 |    0.00 |    0.00 |   50.00 |
         |       . |    0.00 |    4.17 |    0.00 |    0.00 |    0.00 |   20.00 |
---------+---------+---------+---------+---------+---------+---------+---------+
11-20    |      10 |       3 |       1 |       0 |       0 |       1 |       1 |       6
         |       . |    3.75 |    1.25 |    0.00 |    0.00 |    1.25 |    1.25 |    7.50
         |       . |   50.00 |   16.67 |    0.00 |    0.00 |   16.67 |   16.67 |
         |       . |    9.38 |    4.17 |    0.00 |    0.00 |   25.00 |   20.00 |
---------+---------+---------+---------+---------+---------+---------+---------+
21-30    |      10 |       8 |       3 |       1 |       1 |       0 |       0 |      13
         |       . |   10.00 |    3.75 |    1.25 |    1.25 |    0.00 |    0.00 |   16.25
         |       . |   61.54 |   23.08 |    7.69 |    7.69 |    0.00 |    0.00 |
         |       . |   25.00 |   12.50 |   11.11 |   16.67 |    0.00 |    0.00 |
---------+---------+---------+---------+---------+---------+---------+---------+
>30      |      20 |      20 |      19 |       8 |       5 |       3 |       2 |      57
         |       . |   25.00 |   23.75 |   10.00 |    6.25 |    3.75 |    2.50 |   71.25
         |       . |   35.09 |   33.33 |   14.04 |    8.77 |    5.26 |    3.51 |
         |       . |   62.50 |   79.17 |   88.89 |   83.33 |   75.00 |   40.00 |
---------+---------+---------+---------+---------+---------+---------+---------+
TOTAL              .      32        24         9         6         4         5        80
                   .   40.00     30.00     11.25      7.50      5.00      6.25    100.00
```

Table 221. Number and percent of institutions offering various members of different science courses, by percent of faculty having access to computers for administrative purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Number of Different Science Courses Offered 1978-79

Percent of Faculty Having Access to Computers for Instructional Purposes

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	23 . . .	9 . . .	13 . . .	4 . . .	6 . . .	1 . . .	3 . . .	. .
0-5	11 . . .	2 2.41 100.00 8.33	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 2.41
6-10	13 . . .	0 0.00 0.00 0.00	1 1.20 50.00 3.03	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.20 50.00 20.00	2 2.41
11-20	10 . . .	4 4.82 66.67 16.67	1 1.20 16.67 3.03	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.20 16.67 100.00	0 0.00 0.00 0.00	6 7.23
21-30	10 . . .	5 6.02 38.46 20.83	6 7.23 46.15 18.18	1 1.20 7.69 7.69	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.20 7.69 20.00	13 15.66
>30	17 . . .	13 15.66 21.67 54.17	25 30.12 41.67 75.76	12 14.46 20.00 92.31	7 8.43 11.67 100.00	0 0.00 0.00 0.00	3 3.61 5.00 60.00	60 72.29
TOTAL	. .	24 28.92	33 39.76	13 15.66	7 8.43	1 1.20	5 6.02	83 100.00

Table222 . Number and percent of institutions offering various members of different science courses, by percent of faculty having access to computers for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Number of Different Science Courses Offered 1978-79		Percent of Faculty Having Access to Computers for Research Purposes						
FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	25 . . .	12 . . .	14 . . .	4 . . .	3 . . .	0 . . .	1 . . .	. .
0-5	10 . . .	1 1.22 33.33 5.56	2 2.44 66.67 5.41	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	3 3.66
6-10	13 . . .	1 1.22 50.00 5.56	1 1.22 50.00 2.70	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 2.44
11-20	10 . . .	3 3.66 50.00 16.67	2 2.44 33.33 5.41	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.22 16.67 100.00	0 0.00 0.00 0.00	6 7.32
21-30	10 . . .	4 4.88 30.77 22.22	6 7.32 46.15 16.22	2 2.44 15.38 11.11	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.22 7.69 100.00	13 15.85
>30	19 . . .	9 10.98 15.52 50.00	26 31.71 44.83 70.27	16 19.51 27.59 88.89	7 8.54 12.07 100.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	58 70.73
TOTAL	. .	18 21.95	37 45.12	18 21.95	7 8.54	1 1.22	1 1.22	82 100.00

Table 223. Number and percent of institutions offering various members of different science courses, by percent of faculty having access to computers for research purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Number of Different Science Courses Offered 1978-79

```
FREQUENCY|
PERCENT  |   Percent of Faculty Having Access to Computers for Games-Experiment Purposes
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40%  |41%-60%  |61%-80%  |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     34 |     13 |      4 |      2 |      6 |      0 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-5      |     11 |      2 |      0 |      0 |      0 |      0 |      0 |      2
         |      . |   3.03 |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |   3.03
         |      . | 100.00 |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |
         |      . |   6.90 |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
6-10     |     13 |      0 |      1 |      0 |      0 |      0 |      1 |      2
         |      . |   0.00 |   1.52 |   0.00 |   0.00 |   0.00 |   1.52 |   3.03
         |      . |   0.00 |  50.00 |   0.00 |   0.00 |   0.00 |  50.00 |
         |      . |   0.00 |   3.57 |   0.00 |   0.00 |   0.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
11-20    |     11 |      2 |      1 |      2 |      0 |      0 |      0 |      5
         |      . |   3.03 |   1.52 |   3.03 |   0.00 |   0.00 |   0.00 |   7.58
         |      . |  40.00 |  20.00 |  40.00 |   0.00 |   0.00 |   0.00 |
         |      . |   6.90 |   3.57 |  40.00 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
21-30    |     10 |      7 |      6 |      0 |      0 |      0 |      0 |     13
         |      . |  10.61 |   9.09 |   0.00 |   0.00 |   0.00 |   0.00 |  19.70
         |      . |  53.85 |  46.15 |   0.00 |   0.00 |   0.00 |   0.00 |
         |      . |  24.14 |  21.43 |   0.00 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>30      |     33 |     18 |     20 |      3 |      2 |      1 |      0 |     44
         |      . |  27.27 |  30.30 |   4.55 |   3.03 |   1.52 |   0.00 |  66.67
         |      . |  40.91 |  45.45 |   6.82 |   4.55 |   2.27 |   0.00 |
         |      . |  62.07 |  71.43 |  60.00 | 100.00 | 100.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       29       28        5        2        1        1       66
                .    43.94    42.42     7.58     3.03     1.52     1.52   100.00
```

Table 224. Number and percent of institutions offering various members of different science courses, by percent of faculty having access to computers for games-experiment purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Percent of Faculty Having Access to Computers for Administrative Purposes

Total Current Enrollment in Science Courses

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	25	18	6	4	4	1	0	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	6	0	1	0	0	0	1	2
	.	0.00	1.23	0.00	0.00	0.00	1.23	2.47
	.	0.00	50.00	0.00	0.00	0.00	50.00	
	.	0.00	4.00	0.00	0.00	0.00	20.00	
51-100	10	1	1	1	0	1	0	4
	.	1.23	1.23	1.23	0.00	1.23	0.00	4.94
	.	25.00	25.00	25.00	0.00	25.00	0.00	
	.	3.13	4.00	11.11	0.00	25.00	0.00	
101-250	13	2	2	0	0	0	1	5
	.	2.47	2.47	0.00	0.00	0.00	1.23	6.17
	.	40.00	40.00	0.00	0.00	0.00	20.00	
	.	6.25	8.00	0.00	0.00	0.00	20.00	
251-500	4	7	2	0	1	0	0	10
	.	8.64	2.47	0.00	1.23	0.00	0.00	12.35
	.	70.00	20.00	0.00	10.00	0.00	0.00	
	.	21.88	8.00	0.00	16.67	0.00	0.00	
501-1000	12	3	4	0	0	0	1	8
	.	3.70	4.94	0.00	0.00	0.00	1.23	9.88
	.	37.50	50.00	0.00	0.00	0.00	12.50	
	.	9.38	16.00	0.00	0.00	0.00	20.00	
>1000	19	19	15	8	5	3	2	52
	.	23.46	18.52	9.88	6.17	3.70	2.47	64.20
	.	36.54	28.85	15.38	9.62	5.77	3.85	
	.	59.38	60.00	88.89	83.33	75.00	40.00	
TOTAL	.	32	25	9	6	4	5	81
	.	39.51	30.86	11.11	7.41	4.94	6.17	100.00

Table 225. Number of percent of institutions having various total enrollments in science courses, by percent of faculty having access to computers for administrative purposes, as reported by 83 vice-presidents or deans in minority higher education institutions.

441

442

Percent of Faculty Having Access to Computers for Instructional Purposes

Total Current Enrollment in Science Courses

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	23 . . .	9 . . .	12 . . .	4 . . .	6 . . .	1 . . .	3 . . .	. .
0-50	6 . . .	0 0.00 0.00 0.00	1 1.19 50.00 2.94	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.19 50.00 20.00	2 2.38
51-100	9 . . .	2 2.38 40.00 8.33	1 1.19 20.00 2.94	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.19 20.00 100.00	1 1.19 20.00 20.00	5 5.95
101-250	13 . . .	2 2.38 40.00 8.33	2 2.38 40.00 5.88	0 0.00 0.00 0.00	1 1.19 20.00 14.29	0 0.00 0.00 0.00	0 0.00 0.00 0.00	5 5.95
251-500	4 . . .	3 3.57 30.00 12.50	5 5.95 50.00 14.71	1 1.19 10.00 7.69	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.19 10.00 20.00	10 11.90
501-1000	11 . . .	3 3.57 33.33 12.50	3 3.57 33.33 8.82	2 2.38 22.22 15.38	1 1.19 11.11 14.29	0 0.00 0.00 0.00	0 0.00 0.00 0.00	9 10.71
>1000	18 . . .	14 16.67 26.42 58.33	22 26.19 41.51 64.71	10 11.90 18.87 76.92	5 5.95 9.43 71.43	0 0.00 0.00 0.00	2 2.38 3.77 40.00	53 63.10
TOTAL	. .	24 28.57	34 40.48	13 15.48	7 8.33	1 1.19	5 5.95	84 100.00

Table 226. Number of percent of institutions having various total enrollments in science courses, by percent of faculty having access to computers for instructional purposes, as reported by 83 vice-presidents or deans in minority higher education institutions.

larger (See Table 227 and collapse categories of enrollments of 500 or less.); and 4) there is no consistent relationship with the percentage of science faculty who use computers for experimentation or games despite the contingency coefficient of 0.69 associated with Table 228. The coefficient appears to be an artifact of a few institutions with low science enrollments and large percentages of faculty who use computers for experimentation or games.

Tables 229 through 232 display relationships between the number of enrolled science majors in minority institutions and percentages of science faculty who use computers for various academic purposes. It appears that, in institutions with larger numbers of enrolled science majors, 1) there is a slight tendency for higher percentages of science faculty to use computers for facilitating administration of their classes (However, note the few institutions with small numbers of majors and high percentages of faculty reported to use computers for this purpose. See Table 229; 2) there is no consistent relationship with the percentage of faculty who use computers for facilitating instruction in classes (See Table 230; note the contingency coefficient of 0.53 and the slight tendency for a higher percentage of science faculty to use computers for this purpose in institutions with mid-range numbers of science majors.); 3) there is a moderate tendency for a higher percentage of science faculty to use computers as a tool in their research (See Table 231; the contingency coefficient equals 0.52); and 4) there is no apparent tendency for a greater percentage of science faculty to use computers for games or experimentation (See Table 232; the contingency coefficient equals 0.56).

D. Relationships Between Courses and Students in the Sciences, and Efforts to Improve Academic Computing Capabilities

The six tables discussed in this section illustrate relationships between the size of academic programs in the sciences at minority institutions and two

Percent of Faculty Having Access to Computers for Research Purposes

Total Current Enrollment in Science Courses

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	25	12	13	4	3	0	1	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	6	1	1	0	0	0	0	2
	.	1.20	1.20	0.00	0.00	0.00	0.00	2.41
	.	50.00	50.00	0.00	0.00	0.00	0.00	
	.	5.56	2.63	0.00	0.00	0.00	0.00	
51-100	10	1	2	0	0	1	0	4
	.	1.20	2.41	0.00	0.00	1.20	0.00	4.82
	.	25.00	50.00	0.00	0.00	25.00	0.00	
	.	5.56	5.26	0.00	0.00	100.00	0.00	
101-250	13	1	3	0	1	0	0	5
	.	1.20	3.61	0.00	1.20	0.00	0.00	6.02
	.	20.00	60.00	0.00	20.00	0.00	0.00	
	.	5.56	7.89	0.00	14.29	0.00	0.00	
251-500	4	4	3	2	0	0	1	10
	.	4.82	3.61	2.41	0.00	0.00	1.20	12.05
	.	40.00	30.00	20.00	0.00	0.00	10.00	
	.	22.22	7.89	11.11	0.00	0.00	100.00	
501-1000	12	2	5	1	0	0	0	8
	.	2.41	6.02	1.20	0.00	0.00	0.00	9.64
	.	25.00	62.50	12.50	0.00	0.00	0.00	
	.	11.11	13.16	5.56	0.00	0.00	0.00	
>1000	17	9	24	15	6	0	0	54
	.	10.84	28.92	18.07	7.23	0.00	0.00	65.06
	.	16.67	44.44	27.78	11.11	0.00	0.00	
	.	50.00	63.16	83.33	85.71	0.00	0.00	
TOTAL	.	18	38	18	7	1	1	83
	.	21.69	45.78	21.69	8.43	1.20	1.20	100.00

Table 227. Number of percent of institutions having various total enrollments in science courses, by percent of faculty having access to computers for research purposes, as reported by 83 vice-presidents or deans in minority higher education institutions.

Percent of Faculty Having Access to Computers for Games-Experiment Purposes

Total Current Enrollment in Science Courses

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	34 . . .	13 . . .	3 . . .	2 . . .	6 . . .	0 . . .	0 . . .	. .
0-50	6 . . .	0 0.00 0.00 0.00	1 1.49 50.00 3.45	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.49 50.00 100.00	2 2.99
51-100	10 . . .	3 4.48 75.00 10.34	0 0.00 0.00 0.00	1 1.49 25.00 20.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	4 5.97
101-250	14 . . .	2 2.99 50.00 6.90	1 1.49 25.00 3.45	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.49 25.00 100.00	0 0.00 0.00 0.00	4 5.97
251-500	4 . . .	4 5.97 40.00 13.79	6 8.96 60.00 20.69	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	10 14.93
501-1000	13 . . .	1 1.49 14.29 3.45	5 7.46 71.43 17.24	1 1.49 14.29 20.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	7 10.45
>1000	31 . . .	19 28.36 47.50 65.52	16 23.88 40.00 55.17	3 4.48 7.50 60.00	2 2.99 5.00 100.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	40 59.70
TOTAL	. .	29 43.28	29 43.28	5 7.46	2 2.99	1 1.49	1 1.49	67 100.00

449

Table 228. Number of percent of institutions having various total enrollments in science courses, by percent of faculty having access to computers for games-experiment purposes, as reported by 83 vice-presidents or deans in minority higher education institutions.

448

Percent of Faculty Having Access to Computers for Administrative Purposes

Number of Science Majors Enrolled

REQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	25	18	6	4	4	1	0	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	25	1	1	0	0	1	3	6
	.	1.23	1.23	0.00	0.00	1.23	3.70	7.41
	.	16.67	16.67	0.00	0.00	16.67	50.00	
	.	3.13	4.00	0.00	0.00	25.00	60.00	
51-100	9	4	3	1	0	0	0	8
	.	4.94	3.70	1.23	0.00	0.00	0.00	9.88
	.	50.00	37.50	12.50	0.00	0.00	0.00	
	.	12.50	12.00	11.11	0.00	0.00	0.00	
101-250	9	7	5	1	0	0	2	15
	.	8.64	6.17	1.23	0.00	0.00	2.47	18.52
	.	46.67	33.33	6.67	0.00	0.00	13.33	
	.	21.88	20.00	11.11	0.00	0.00	40.00	
251-500	14	10	5	1	4	1	0	21
	.	12.35	6.17	1.23	4.94	1.23	0.00	25.93
	.	47.62	23.81	4.76	19.05	4.76	0.00	
	.	31.25	20.00	11.11	66.67	25.00	0.00	
501-1000	2	5	2	2	1	1	0	11
	.	6.17	2.47	2.47	1.23	1.23	0.00	13.58
	.	45.45	18.18	18.18	9.09	9.09	0.00	
	.	15.63	8.00	22.22	16.67	25.00	0.00	
>1000	5	5	9	4	1	1	0	20
	.	6.17	11.11	4.94	1.23	1.23	0.00	24.69
	.	25.00	45.00	20.00	5.00	5.00	0.00	
	.	15.63	36.00	44.44	16.67	25.00	0.00	
TOTAL	.	32	25	9	6	4	5	81
	.	39.51	30.86	11.11	7.41	4.94	6.17	100.00

Table 229. Number and percent of institutions with various numbers of science majors, by percent of faculty having access to computers for administrative purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Number of Science Majors Enrolled

```
FREQUENCY|
PERCENT  |   Percent of Faculty Having Access to Computers for Instructional Purposes
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     23 |      9 |     12 |      4 |      6 |      1 |      3 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |     25 |      2 |      2 |      0 |      0 |      1 |      1 |      6
         |      . |   2.38 |   2.38 |   0.00 |   0.00 |   1.19 |   1.19 |   7.14
         |      . |  33.33 |  33.33 |   0.00 |   0.00 |  16.67 |  16.67 |
         |      . |   8.33 |   5.88 |   0.00 |   0.00 | 100.00 |  20.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      9 |      3 |      4 |      0 |      1 |      0 |      0 |      8
         |      . |   3.57 |   4.76 |   0.00 |   1.19 |   0.00 |   0.00 |   9.52
         |      . |  37.50 |  50.00 |   0.00 |  12.50 |   0.00 |   0.00 |
         |      . |  12.50 |  11.76 |   0.00 |  14.29 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      6 |      5 |      8 |      3 |      1 |      0 |      1 |     18
         |      . |   5.95 |   9.52 |   3.57 |   1.19 |   0.00 |   1.19 |  21.43
         |      . |  27.78 |  44.44 |  16.67 |   5.56 |   0.00 |   5.56 |
         |      . |  20.83 |  23.53 |  23.08 |  14.29 |   0.00 |  20.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |     14 |      8 |      5 |      2 |      3 |      0 |      3 |     21
         |      . |   9.52 |   5.95 |   2.38 |   3.57 |   0.00 |   3.57 |  25.00
         |      . |  38.10 |  23.81 |   9.52 |  14.29 |   0.00 |  14.29 |
         |      . |  33.33 |  14.71 |  15.38 |  42.86 |   0.00 |  60.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
501-1000 |      2 |      1 |      7 |      2 |      1 |      0 |      0 |     11
         |      . |   1.19 |   8.33 |   2.38 |   1.19 |   0.00 |   0.00 |  13.10
         |      . |   9.09 |  63.64 |  18.18 |   9.09 |   0.00 |   0.00 |
         |      . |   4.17 |  20.59 |  15.38 |  14.29 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      5 |      5 |      8 |      6 |      1 |      0 |      0 |     20
         |      . |   5.95 |   9.52 |   7.14 |   1.19 |   0.00 |   0.00 |  23.81
         |      . |  25.00 |  40.00 |  30.00 |   5.00 |   0.00 |   0.00 |
         |      . |  20.83 |  23.53 |  46.15 |  14.29 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL             .       24       34       13        7        1        5       84
                  .    28.57    40.48    15.48     8.33     1.19     5.95   100.00
```

Table 230. Number and percent of institutions with various numbers of science majors, by percent of faculty having access to computers for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Percent of Faculty Having Access to Computers for Research Purposes

Number of Science Majors Enrolled

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	25	12	13	4	3	0	1	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	25	3	2	0	0	1	0	6
	.	3.61	2.41	0.00	0.00	1.20	0.00	7.23
	.	50.00	33.33	0.00	0.00	16.67	0.00	
	.	16.67	5.26	0.00	0.00	100.00	0.00	
51-100	9	1	6	0	1	0	0	8
	.	1.20	7.23	0.00	1.20	0.00	0.00	9.64
	.	12.50	75.00	0.00	12.50	0.00	0.00	
	.	5.56	15.79	0.00	14.29	0.00	0.00	
101-250	10	5	5	3	1	0	0	14
	.	6.02	6.02	3.61	1.20	0.00	0.00	16.87
	.	35.71	35.71	21.43	7.14	0.00	0.00	
	.	27.78	13.16	16.67	14.29	0.00	0.00	
251-500	13	5	9	5	2	0	1	22
	.	6.02	10.84	6.02	2.41	0.00	1.20	26.51
	.	22.73	40.91	22.73	9.09	0.00	4.55	
	.	27.78	23.68	27.78	28.57	0.00	100.00	
501-1000	2	2	6	3	0	0	0	11
	.	2.41	7.23	3.61	0.00	0.00	0.00	13.25
	.	18.18	54.55	27.27	0.00	0.00	0.00	
	.	11.11	15.79	16.67	0.00	0.00	0.00	
>1000	3	2	10	7	3	0	0	22
	.	2.41	12.05	8.43	3.61	0.00	0.00	26.51
	.	9.09	45.45	31.82	13.64	0.00	0.00	
	.	11.11	26.32	38.89	42.86	0.00	0.00	
TOTAL	.	18	38	18	7	1	1	83
	.	21.69	45.78	21.69	8.43	1.20	1.20	100.00

Table 231. Number and percent of institutions with various numbers of science majors, by percent of faculty having access to computers for research purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Percent of Faculty Having Access to Computers for Games-Experiment Purposes

Number of Science Majors Enrolled

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	34 . . .	13 . . .	3 . . .	2 . . .	6 . . .	0 . . .	0 . . .	. .
0-50	25 . . .	2 2.99 33.33 6.90	2 2.99 33.33 6.90	1 1.49 16.67 20.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.49 16.67 100.00	6 8.96
51-100	10 . . .	4 5.97 57.14 13.79	2 2.99 28.57 6.90	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.49 14.29 100.00	0 0.00 0.00 0.00	7 10.45
101-250	12 . . .	4 5.97 33.33 13.79	8 11.94 66.67 27.59	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	12 17.91
251-500	17 . . .	8 11.94 44.44 27.59	6 8.96 33.33 20.69	3 4.48 16.67 60.00	1 1.49 5.56 50.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	18 26.87
501-1000	3 . . .	3 4.48 30.00 10.34	6 8.96 60.00 20.69	1 1.49 10.00 20.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	10 14.93
>1000	11 . . .	8 11.94 57.14 27.59	5 7.46 35.71 17.24	0 0.00 0.00 0.00	1 1.49 7.14 50.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	14 20.90
TOTAL	. .	29 43.28	29 43.28	5 7.46	2 2.99	1 1.49	1 1.49	67 100.00

Table 232. Number and percent of institutions with various numbers of science majors, by percent of faculty having access to computers for games-experiment purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

indicators of institutional efforts to improve the status of academic computing. The indicators of institutional efforts to improve their academic computing status are based on the responses of academic vice presidents/deans to the question "Have campus-wide study groups met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes?", and science department heads' responses to the question "Have study groups from your department met to plan for the acquisition or improvement of computer facilities and capabilities?". These indicators are related to academic vice presidents/deans' reports on the numbers of different science courses offered by their institutions, total current enrollments in science classes, and numbers of enrolled science majors.

From Table 233 we see that there is a definitely positive relationship between the number of different science courses offered by an institution and the probability that a campus-wide study group has met to study the improvement of academic computing. The associated contingency coefficient is 0.49. There appears to be virtually no relationship between the number of different science courses an institution offers and the probability that departmental study groups have met to plan for the improvement of computing capabilities (See Table 234; the contingency coefficient equals 0.30). In institutions with larger total enrollments in science courses, there is some tendency toward a higher probability that a campus-wide computing study group has met (Table 235), but the function is not monotonic. The associated contingency coefficient is 0.50. In institutions with total science enrollments of 250 or less, 41 percent of heads of science departments report that departmental computing study groups have met, whereas in institutions with total science enrollments of 251 or more, the corresponding percentage is 66. Thus there is a modest relationship between science enrollment and this indicator of institutional effort to

```
                    TABLE OF DSC78 BY CWSG

DSC78     N DIFFERENT SCIENCE COURSES 78-79   CWSG         CAMPUSW

FREQUENCY|  Campus-Wide Computer Groups Have Met
PERCENT  |
ROW PCT  |
COL PCT  |  .      |YES      |NO       |  TOTAL
---------+---------+---------+---------+
   .     |       0 |       3 |       3 |     .
         |       . |       . |       . |     .
         |       . |       . |       . |
         |       . |       . |       . |
---------+---------+---------+---------+
0-5      |       0 |       2 |       7 |      9
         |       . |    2.74 |    9.59 |  12.33
         |       . |   22.22 |   77.78 |
         |       . |    4.08 |   29.17 |
---------+---------+---------+---------+
6-10     |       0 |       3 |       8 |     11
         |       . |    4.11 |   10.96 |  15.07
         |       . |   27.27 |   72.73 |
         |       . |    6.12 |   33.33 |
---------+---------+---------+---------+
11-20    |       1 |       6 |       3 |      9
         |       . |    8.22 |    4.11 |  12.33
         |       . |   66.67 |   33.33 |
         |       . |   12.24 |   12.50 |
---------+---------+---------+---------+
21-30    |       0 |      11 |       2 |     13
         |       . |   15.07 |    2.74 |  17.81
         |       . |   84.62 |   15.38 |
         |       . |   22.45 |    8.33 |
---------+---------+---------+---------+
>30      |       3 |      27 |       4 |     31
         |       . |   36.99 |    5.48 |  42.47
         |       . |   87.10 |   12.90 |
         |       . |   55.10 |   16.67 |
---------+---------+---------+---------+
TOTAL            .        49        24       73
                 .     67.12     32.88   100.00
```

Number of Different Science Courses Offered 1978-79

Table 233. Number and percent of institutions offering various numbers of different science courses, by institutions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Number of Different Science Courses Offered 1978-79

```
                        TABLE OF DSC78 BY STUD

DSC78     N DIFFERENT SCIENCE COURSES 78-79   STUD       DEPT STUDY GROL

FREQUENCY|
PERCENT  |          Department Computer Groups Have Met
ROW PCT  |
COL PCT  |         |YES      |NO       |DO  NOT  |PRES FAC|
         |        .|         |         | KNOW    | EXCEL  |  TOTAL
---------+--------+---------+---------+---------+--------+
    .    |       1|       36|       19|        2|       1|       .
         |       .|        .|        .|        .|       .|       .
         |       .|        .|        .|        .|       .|
         |       .|        .|        .|        .|       .|
---------+--------+---------+---------+---------+--------+
0-5      |       6|        4|        3|        0|       0|       7
         |       .|     3.36|     2.52|     0.00|       .|    5.88
         |       .|    57.14|    42.86|     0.00|       .|
         |       .|     5.63|     7.50|     0.00|       .|
---------+--------+---------+---------+---------+--------+
6-10     |       4|        6|        5|        0|       0|      11
         |       .|     5.04|     4.20|     0.00|       .|    9.24
         |       .|    54.55|    45.45|     0.00|       .|
         |       .|     8.45|    12.50|     0.00|       .|
---------+--------+---------+---------+---------+--------+
11-20    |       2|        4|        8|        2|       0|      14
         |       .|     3.36|     6.72|     1.68|       .|   11.76
         |       .|    28.57|    57.14|    14.29|       .|
         |       .|     5.63|    20.00|    25.00|       .|
---------+--------+---------+---------+---------+--------+
21-30    |       5|       11|        7|        0|       0|      18
         |       .|     9.24|     5.88|     0.00|       .|   15.13
         |       .|    61.11|    38.89|     0.00|       .|
         |       .|    15.49|    17.50|     0.00|       .|
---------+--------+---------+---------+---------+--------+
>30      |       8|       46|       17|        6|       0|      69
         |       .|    38.66|    14.29|     5.04|       .|   57.98
         |       .|    66.67|    24.64|     8.70|       .|
         |       .|    64.79|    42.50|    75.00|       .|
---------+--------+---------+---------+---------+--------+
TOTAL            .       71        40         8        .      119
                 .    59.66     33.61      6.72        .   100.00
```

Table 234. Number and percent of institutions offering various numbers of different science courses, by institutions reporting departmental groups having met to plan for the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 178 heads of science departments in minority higher education institutions.

```
                    TABLE OF SCIENR BY CWSG

SCIENR     TOTAL SCIENCE CLASSES ENROLLMENT   CWSG        CAMPUSWI

FREQUENCY|  Campus-Wide Computer Groups Have Met
PERCENT  |
ROW PCT  |
COL PCT  |  .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
       .  |      0 |      3 |      2 |      .
          |      . |      . |      . |      .
          |      . |      . |      . |
          |      . |      . |      . |
---------+--------+--------+--------+
0-50      |      0 |      0 |      7 |      7
          |      . |   0.00 |   9.46 |   9.46
          |      . |   0.00 | 100.00 |
          |      . |   0.00 |  28.00 |
---------+--------+--------+--------+
51-100    |      0 |      5 |      4 |      9
          |      . |   6.76 |   5.41 |  12.16
          |      . |  55.56 |  44.44 |
          |      . |  10.20 |  16.00 |
---------+--------+--------+--------+
101-250   |      0 |      6 |      6 |     12
          |      . |   8.11 |   8.11 |  16.22
          |      . |  50.00 |  50.00 |
          |      . |  12.24 |  24.00 |
---------+--------+--------+--------+
251-500   |      0 |      8 |      1 |      9
          |      . |  10.81 |   1.35 |  12.16
          |      . |  88.89 |  11.11 |
          |      . |  16.33 |   4.00 |
---------+--------+--------+--------+
501-1000  |      0 |      8 |      5 |     13
          |      . |  10.81 |   6.76 |  17.57
          |      . |  61.54 |  38.46 |
          |      . |  16.33 |  20.00 |
---------+--------+--------+--------+
>1000     |      4 |     22 |      2 |     24
          |      . |  29.73 |   2.70 |  32.43
          |      . |  91.67 |   8.33 |
          |      . |  44.90 |   8.00 |
---------+--------+--------+--------+
TOTAL            .       49       25       74
                 .    66.22    33.78   100.00
```

Total Current Enrollment in Science Courses

Table 235. Number and percent of institutions having various total enrollments in science courses, by institutions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

improve computing capability (See Table 236; the contingency coefficient equals 0.35). The larger the number of enrolled science majors, the higher the probability that an academic vice president/dean will report that campus-wide computing study groups have met. However, the probability increases very slowly once the number of enrolled majors in science exceeds 50, as shown in Table 237. The associated contingency coefficient is 0.40. From Table 238, we see that there is a generally similar relationship between the number of enrolled science majors and the proportion of science department heads who report that departmental computer study groups have met. But here the relationship is only slightly positive, with an associated contingency coefficient of 0.32.

E. Relationships Between the Size of Science Faculties and Access to Academic Computing

The tables examined in this section illustrate relationships between the size of institutions' faculties in the sciences and those indicators of access to academic computing discussed in Section A, above. Here again, the data available do not support a causal argument in either direction. It may well be that larger science faculties are effective in bringing pressure on their institutions to improve access to computers for academic purposes. Conversely, those institutions providing greater access to academic computing might attract larger numbers of science faculty members, and perhaps higher quality faculty members in science, thus causing science programs to flourish. All we can tell from the available data is whether the variables are related, thus suggesting the possibility of a causal relationship in either direction.

From Tables 239 and 240 we see that all academic vice presidents/deans in institutions with more than ten science faculty members (either total or full-time equivalent) report that their institutions have access to a computer.

Total Current Enrollment in Science Courses

```
                         TABLE OF SCIENR BY STUC

SCIENR    TOTAL SCIENCE CLASSES ENRCLLMENT   STUC       DEPT STUDY GROUP

FREQUENCY|
 PERCENT |            Departmental Computer Groups Have Met
 ROW PCT |
 COL PCT |        |YES      |NO       |DO  NCT |PRES FAC|   TOTAL
         |       .|         |         | KNOW   | EXCEL  |
---------+--------+---------+---------+--------+--------+
       . |      1 |      35 |      19 |      2 |      1 |       .
         |      . |       . |       . |      . |      . |       .
         |      . |       . |       . |      . |      . |
         |      . |       . |       . |      . |      . |
---------+--------+---------+---------+--------+--------+
0-50     |      2 |       1 |       5 |      0 |      0 |       6
         |      . |    0.83 |    4.17 |   0.00 |      . |    5.00
         |      . |   16.67 |   83.33 |   0.00 |      . |
         |      . |    1.39 |   12.50 |   0.00 |      . |
---------+--------+---------+---------+--------+--------+
51-100   |      4 |       5 |       4 |      1 |      0 |      10
         |      . |    4.17 |    3.33 |   0.83 |      . |    8.33
         |      . |   50.00 |   40.00 |  10.00 |      . |
         |      . |    6.94 |   10.00 |  12.50 |      . |
---------+--------+---------+---------+--------+--------+
101-250  |      5 |       6 |       6 |      1 |      0 |      13
         |      . |    5.00 |    5.00 |   0.83 |      . |   10.83
         |      . |   46.15 |   46.15 |   7.69 |      . |
         |      . |    8.33 |   15.00 |  12.50 |      . |
---------+--------+---------+---------+--------+--------+
251-500  |      3 |      10 |       1 |      0 |      0 |      11
         |      . |    8.33 |    0.83 |   0.00 |      . |    9.17
         |      . |   90.91 |    9.09 |   0.00 |      . |
         |      . |   13.89 |    2.50 |   0.00 |      . |
---------+--------+---------+---------+--------+--------+
501-1000 |      4 |      13 |       2 |      1 |      0 |      16
         |      . |   10.83 |    1.67 |   0.83 |      . |   13.33
         |      . |   81.25 |   12.50 |   6.25 |      . |
         |      . |   18.06 |    5.00 |  12.50 |      . |
---------+--------+---------+---------+--------+--------+
>1000    |      7 |      37 |      22 |      5 |      0 |      64
         |      . |   30.83 |   18.33 |   4.17 |      . |   53.33
         |      . |   57.81 |   34.38 |   7.81 |      . |
         |      . |   51.39 |   55.00 |  62.50 |      . |
---------+--------+---------+---------+--------+--------+
TOTAL           .        72        40        8        .       120
                .     60.00     33.33     6.67        .    100.00
```

Table 236. Number and percent of institutions having various total enrollments in science courses, by institutions reporting departmental groups having met to plan for the acquisition or improvement of computer facilities or capabilities for instructional purposes, as reported by 178 heads of science departments in minority higher education institutions.

```
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M                    21:36 WE

                    TABLE OF ENRMAJ BY CWSG

        ENRMAJ    NUMBER SCIENCE MAJORS ENROLLED    CWSG        CAMPUSWIC

Number of Science Majors Enrolled

        FREQUENCY|
        PERCENT  |  Campus-Wide Computer Groups Have Met
        ROW PCT  |
        COL PCT  | .      |YES     |NO      |  TOTAL
        ---------+--------+--------+--------+
               . |      0 |      2 |      3 |      .
                 |      . |      . |      . |      .
                 |      . |      . |      . |
                 |      . |      . |      . |
        ---------+--------+--------+--------+
        0-50     |      0 |     10 |     15 |     25
                 |      . |  13.51 |  20.27 |  33.78
                 |      . |  40.00 |  60.00 |
                 |      . |  20.00 |  62.50 |
        ---------+--------+--------+--------+
        51-100   |      0 |      7 |      2 |      9
                 |      . |   9.46 |   2.70 |  12.16
                 |      . |  77.78 |  22.22 |
                 |      . |  14.00 |   8.33 |
        ---------+--------+--------+--------+
        101-250  |      0 |      9 |      3 |     12
                 |      . |  12.16 |   4.05 |  16.22
                 |      . |  75.00 |  25.00 |
                 |      . |  18.00 |  12.50 |
        ---------+--------+--------+--------+
        251-500  |      1 |     14 |      3 |     17
                 |      . |  18.92 |   4.05 |  22.97
                 |      . |  82.35 |  17.65 |
                 |      . |  28.00 |  12.50 |
        ---------+--------+--------+--------+
        501-1000 |      2 |      4 |      0 |      4
                 |      . |   5.41 |   0.00 |   5.41
                 |      . | 100.00 |   0.00 |
                 |      . |   8.00 |   0.00 |
        ---------+--------+--------+--------+
        >1000    |      1 |      6 |      1 |      7
                 |      . |   8.11 |   1.35 |   9.46
                 |      . |  85.71 |  14.29 |
                 |      . |  12.00 |   4.17 |
        ---------+--------+--------+--------+
        TOTAL           .       50       24       74
                        .    67.57    32.43   100.00
```

Table 237. Number and percent of institutions with various numbers of science majors, by institutions reporting campus-wide groups having met to plan for the acquisition or improvement of computer facilities or capabilities for instructional purposes, as reported by 178 heads of science departments in minority higher education institutions.

Departmental Computer Groups Have Met

Number of Science Majors Enrolled

```
                         TABLE OF ENRMAJ BY STUD

ENRMAJ    NUMBER SCIENCE MAJORS ENROLLED   STUD       DEPT STUDY GROUP P

FREQUENCY|
 PERCENT |
 ROW PCT |
 COL PCT |         |YES     |NO        |DO   NOT |PRES FAC|
         |        .|        |          | KNOW    | EXCEL  |  TOTAL
---------+---------+--------+----------+---------+--------+
       . |       1 |     35 |       19 |       2 |      1 |       .
         |       . |      . |        . |       . |      . |       .
         |       . |      . |        . |       . |      . |
         |       . |      . |        . |       . |      . |
---------+---------+--------+----------+---------+--------+
0-50     |      12 |     10 |        9 |       0 |      0 |      19
         |       . |   8.33 |     7.50 |    0.00 |      . |   15.83
         |       . |  52.63 |    47.37 |    0.00 |      . |
         |       . |  13.89 |    22.50 |    0.00 |      . |
---------+---------+--------+----------+---------+--------+
51-100   |       3 |      4 |        9 |       1 |      0 |      14
         |       . |   3.33 |     7.50 |    0.83 |      . |   11.67
         |       . |  28.57 |    64.29 |    7.14 |      . |
         |       . |   5.56 |    22.50 |   12.50 |      . |
---------+---------+--------+----------+---------+--------+
101-250  |       0 |     16 |        5 |       3 |      0 |      24
         |       . |  13.33 |     4.17 |    2.50 |      . |   20.00
         |       . |  66.67 |    20.83 |   12.50 |      . |
         |       . |  22.22 |    12.50 |   37.50 |      . |
---------+---------+--------+----------+---------+--------+
251-500  |       8 |     18 |        8 |       1 |      0 |      27
         |       . |  15.00 |     6.67 |    0.83 |      . |   22.50
         |       . |  66.67 |    29.63 |    3.70 |      . |
         |       . |  25.00 |    20.00 |   12.50 |      . |
---------+---------+--------+----------+---------+--------+
501-1000 |       0 |      9 |        3 |       1 |      0 |      13
         |       . |   7.50 |     2.50 |    0.83 |      . |   10.83
         |       . |  69.23 |    23.08 |    7.69 |      . |
         |       . |  12.50 |     7.50 |   12.50 |      . |
---------+---------+--------+----------+---------+--------+
>1000    |       2 |     15 |        6 |       2 |      0 |      23
         |       . |  12.50 |     5.00 |    1.67 |      . |   19.17
         |       . |  65.22 |    26.09 |    8.70 |      . |
         |       . |  20.83 |    15.00 |   25.00 |      . |
---------+---------+--------+----------+---------+--------+
TOTAL            .       72         40         8        .       120
                 .    60.00      33.33      6.67        .    100.00
```

Table 238. Number and percent of institutions with various numbers of science majors, by institutions reporting departmental groups having met to plan for the acquisition or improvement of computer facilities or capabilities for instructional purposes, as reported by 178 heads of science departments in minority higher education institutions.

```
                    TABLE OF SFFT78 BY INACOMP

SFFT78    NUM FULLTIME FACULTY IN SCIENCE 78-79   INACOMP   DOES

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |  .      |YES      |NO       |  TOTAL
---------+---------+---------+---------+
   .     |       0 |       4 |       1 |     .
         |       . |       . |       . |     .
         |       . |       . |       . |
         |       . |       . |       . |
---------+---------+---------+---------+
0-10     |       1 |      20 |      11 |     31
         |       . |   25.97 |   14.29 |  40.26
         |       . |   64.52 |   35.48 |
         |       . |   30.30 |  100.00 |
---------+---------+---------+---------+
11-20    |       0 |      11 |       0 |     11
         |       . |   14.29 |    0.00 |  14.29
         |       . |  100.00 |    0.00 |
         |       . |   16.67 |    0.00 |
---------+---------+---------+---------+
21-50    |       0 |      18 |       0 |     18
         |       . |   23.38 |    0.00 |  23.38
         |       . |  100.00 |    0.00 |
         |       . |   27.27 |    0.00 |
---------+---------+---------+---------+
>50      |       0 |      17 |       0 |     17
         |       . |   22.08 |    0.00 |  22.08
         |       . |  100.00 |    0.00 |
         |       . |   25.76 |    0.00 |
---------+---------+---------+---------+
TOTAL            .        66        11       77
                 .     85.71     14.29   100.00
```

Institution Has Access to a Computer

Number of Fulltime Science Faculty, 1978-79

Table 239. Number and percent of institutions having various numbers of fulltime science faculty, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
              TABLE OF SFTE78 BY INACOMP

SFTE78    FACULTY IN SCIENCE 78-79   INACOMP   DOES INSTITUTION

FREQUENCY|
PERCENT  |  Institution Has Access to a Computer
ROW PCT  |
COL PCT  |   .    |YES     |NO      |  TOTAL
---------+--------+--------+--------+
    .    |      0 |      5 |      1 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-10     |      1 |     18 |     11 |     29
         |      . |  23.68 |  14.47 |  38.16
         |      . |  62.07 |  37.93 |
         |      . |  27.69 | 100.00 |
---------+--------+--------+--------+
11-20    |      0 |     14 |      0 |     14
         |      . |  18.42 |   0.00 |  18.42
         |      . | 100.00 |   0.00 |
         |      . |  21.54 |   0.00 |
---------+--------+--------+--------+
21-50    |      0 |     18 |      0 |     18
         |      . |  23.68 |   0.00 |  23.68
         |      . | 100.00 |   0.00 |
         |      . |  27.69 |   0.00 |
---------+--------+--------+--------+
>50      |      0 |     15 |      0 |     15
         |      . |  19.74 |   0.00 |  19.74
         |      . | 100.00 |   0.00 |
         |      . |  23.08 |   0.00 |
---------+--------+--------+--------+
TOTAL           .       65       11       76
                .    85.53    14.47   100.00
```

Number of Science Faculty, 1978-79

Table 240. Number and percent of institutions having various numbers of science faculty, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Where the size of the science faculty is ten or less, only two-thirds of institutions have access to a computer. Associated contingency coefficients are 0.45 and 0.46, respectively.

When an institution has more than ten science faculty (either total or full-time equivalent), faculty and students in at least three-fourths of science departments are provided access to computers for academic purposes, according to heads of science departments (See Tables 241 and 242). In institutions with no more than ten science faculty members, faculty and students in fewer than 40 percent of science departments are provided such access. Associated contingency coefficients are 0.46 and 0.52, respectively.

From Tables 243 and 244 we see that the number of science departments in which undergraduates have access to computers increases monotonically as a function of the number of science faculty the institution employs, and tends to show some increase (non-monotonic) as a function of the number of full-time equivalent science faculty the institution employs. However, relationships between these variables are not strong since undergraduates in at least two-thirds of science departments are provided access to computers in any case, according to responding department heads.

There are strong relationships between the sizes of faculty in science (both total and full-time equivalent) and the probability that graduate students enrolled in science departments will have access to computers for academic purposes. From Tables 245 and 246 we can see several distinct breaks in the probability of computer access for graduate students as the size of the science faculty increases. Associated contingency coefficients are 0.64 and 0.65 for the two tables.

From Tables 247 and 248 we see that the percentage of faculty in science departments who have access to computers for academic purposes is virtually

```
                    TABLE OF SFFT78 BY COMPAC

SFFT78     NUM FULLTIME FACULTY IN SCIENCE 78-79    COMPAC      FACL
```

Science Faculty or Students Have
Access to a Computer

Number of Fulltime Science Faculty, 1978-79

```
FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |  .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
    .    |      1 |     38 |     19 |    .
         |      . |      . |      . |    .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-10     |     15 |     10 |     16 |     26
         |      . |   8.26 |  13.22 |  21.49
         |      . |  38.46 |  61.54 |
         |      . |  10.75 |  57.14 |
---------+--------+--------+--------+
11-20    |      2 |     13 |      2 |     15
         |      . |  10.74 |   1.65 |  12.40
         |      . |  86.67 |  13.33 |
         |      . |  13.98 |   7.14 |
---------+--------+--------+--------+
21-50    |      4 |     24 |      8 |     32
         |      . |  19.83 |   6.61 |  26.45
         |      . |  75.00 |  25.00 |
         |      . |  25.81 |  28.57 |
---------+--------+--------+--------+
>50      |      3 |     46 |      2 |     48
         |      . |  38.02 |   1.65 |  39.67
         |      . |  95.83 |   4.17 |
         |      . |  49.46 |   7.14 |
---------+--------+--------+--------+
TOTAL           .       93       28      121
                .    76.86    23.14   100.00
```

Table 241. Number and percent of institutions having various numbers of fulltime science faculty, by institutions providing access to computers for science faculty or students, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                     TABLE OF SFTE78 BY COMPAC

SFTE78    FACULTY IN SCIENCE 78-79    COMPAC    FACULTY-STUDENT A

FREQUENCY|     Science Faculty or Students Have
PERCENT  |          Access to a Computer
ROW PCT  |
COL PCT  |   .    |YES     |NO      |  TOTAL
---------+--------+--------+--------+
    .    |      1 |     39 |     20 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-10     |     14 |      9 |     19 |     28
         |      . |   7.56 |  15.97 |  23.53
         |      . |  32.14 |  67.86 |
         |      . |   9.78 |  70.37 |
---------+--------+--------+--------+
11-20    |      3 |     15 |      3 |     18
         |      . |  12.61 |   2.52 |  15.13
         |      . |  83.33 |  16.67 |
         |      . |  16.30 |  11.11 |
---------+--------+--------+--------+
21-50    |      4 |     25 |      4 |     29
         |      . |  21.01 |   3.36 |  24.37
         |      . |  86.21 |  13.79 |
         |      . |  27.17 |  14.81 |
---------+--------+--------+--------+
>50      |      3 |     43 |      1 |     44
         |      . |  36.13 |   0.84 |  36.97
         |      . |  97.73 |   2.27 |
         |      . |  46.74 |   3.70 |
---------+--------+--------+--------+
TOTAL           .       92       27      119
                .    77.31    22.69   100.00
```

Number of Science Faculty, 1978-79

Table 242. Number and percent of institutions having various numbers of science faculty, by institutions providing access to computers for science faculty or students, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                    TABLE OF SFFT78 BY UNDAC

SFFT78    NUM FULLTIME FACULTY IN SCIENCE 78-79   UNDAC      COMP

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
    .    |     20 |     35 |      3 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-10     |     31 |      7 |      3 |     10
         |      . |   7.45 |   3.19 |  10.64
         |      . |  70.00 |  30.00 |
         |      . |   8.33 |  30.00 |
---------+--------+--------+--------+
11-20    |      4 |     11 |      2 |     13
         |      . |  11.70 |   2.13 |  13.83
         |      . |  84.62 |  15.38 |
         |      . |  13.10 |  20.00 |
---------+--------+--------+--------+
21-50    |     10 |     23 |      3 |     26
         |      . |  24.47 |   3.19 |  27.66
         |      . |  88.46 |  11.54 |
         |      . |  27.38 |  30.00 |
---------+--------+--------+--------+
>50      |      6 |     43 |      2 |     45
         |      . |  45.74 |   2.13 |  47.87
         |      . |  95.56 |   4.44 |
         |      . |  51.19 |  20.00 |
---------+--------+--------+--------+
TOTAL           .       84       10       94
                .    89.36    10.64   100.00
```

Science Undergraduates Have Access to a Computer

Number of Fulltime Science Faculty, 1978-79

Table 243. Number and percent of institutions having various numbers of fulltime science faculty, by institutions providing access to a computer for science undergraduates, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                    TABLE OF SFTE78 BY UNDAC

SFTE78     FACULTY IN SCIENCE 78-79   UNDAC      COMPUTERS AVAIL

FREQUENCY|       Science Undergraduates Have
PERCENT  |         Access to a Computer
ROW PCT  |
COL PCT  |          .|YES     |NO      |  TOTAL
---------+-----------+--------+--------+
    .    |        21 |      36|       3|      .
         |         . |       .|       .|      .
         |         . |       .|       .|
         |         . |       .|       .|
---------+-----------+--------+--------+
0-10     |        33 |       6|       3|      9
         |         . |    6.45|    3.23|   9.68
         |         . |   66.67|   33.33|
         |         . |    7.23|   30.00|
---------+-----------+--------+--------+
11-20    |         5 |      15|       1|     16
         |         . |   16.13|    1.08|  17.20
         |         . |   93.75|    6.25|
         |         . |   18.07|   10.00|
---------+-----------+--------+--------+
21-50    |         6 |      22|       5|     27
         |         . |   23.66|    5.38|  29.03
         |         . |   81.48|   18.52|
         |         . |   26.51|   50.00|
---------+-----------+--------+--------+
>50      |         6 |      40|       1|     41
         |         . |   43.01|    1.08|  44.09
         |         . |   97.56|    2.44|
         |         . |   48.19|   10.00|
---------+-----------+--------+--------+
TOTAL              .       83       10      93
                   .    89.25    10.75  100.00
```

Number of Science Faculty, 1978-79

Table 244 . Number and percent of institutions having various numbers of science faculty, by institutions providing access to a computer for science undergraduates, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                    TABLE OF SFFT78 BY GRADAC

SFFT78    NUM FULLTIME FACULTY IN SCIENCE 78-79   GRADAC    COMPUTER

FREQUENCY|   Science Graduate Students Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |          .|YES      |NO       |NOT APPL|   TOTAL
---------+---------+---------+---------+---------+
    .    |      41 |      12 |       5 |       0 |       .
         |       . |       . |       . |       . |       .
         |       . |       . |       . |       . |
         |       . |       . |       . |       . |
---------+---------+---------+---------+---------+
0-10     |      34 |       0 |       7 |       0 |       7
         |       . |    0.00 |   13.73 |    0.00 |   13.73
         |       . |    0.00 |  100.00 |    0.00 |
         |       . |    0.00 |   58.33 |    0.00 |
---------+---------+---------+---------+---------+
11-20    |      15 |       1 |       1 |       0 |       2
         |       . |    1.96 |    1.96 |    0.00 |    3.92
         |       . |   50.00 |   50.00 |    0.00 |
         |       . |    2.63 |    8.33 |    0.00 |
---------+---------+---------+---------+---------+
21-50    |      28 |       5 |       2 |       1 |       8
         |       . |    9.80 |    3.92 |    1.96 |   15.69
         |       . |   62.50 |   25.00 |   12.50 |
         |       . |   13.16 |   16.67 |  100.00 |
---------+---------+---------+---------+---------+
>50      |      17 |      32 |       2 |       0 |      34
         |       . |   62.75 |    3.92 |    0.00 |   66.67
         |       . |   94.12 |    5.88 |    0.00 |
         |       . |   84.21 |   16.67 |    0.00 |
---------+---------+---------+---------+---------+
TOTAL              .       38        12         1        51
                   .    74.51     23.53      1.96    100.00
```

Number of Fulltime Science Faculty, 1978-79

Table 245. Number and percent of institutions having various numbers of fulltime science faculty, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Science Faculty, 1978-79

```
     S T A T I S T I C A L   A N A L Y S I S   S Y S T E M                21:39 WEC

                        TABLE OF SFTE78 BY GRADAC

     SFTE78    FACULTY IN SCIENCE 78-79    GRADAC    COMPUTERS AVAILABLE T

     FREQUENCY|
      PERCENT |Science Graduate Students Have Access to a Computer
      ROW PCT |
      COL PCT |       .|YES     |NO      |NOT APPL|  TOTAL
     ---------+--------+--------+--------+--------+
         .    |      43|      12|       5|       0|      .
              |       .|       .|       .|       .|      .
              |       .|       .|       .|       .|
              |       .|       .|       .|       .|
     ---------+--------+--------+--------+--------+
     0-10     |      36|       0|       6|       0|      6
              |       .|    0.00|   11.76|    0.00|  11.76
              |       .|    0.00|  100.00|    0.00|
              |       .|    0.00|   50.00|    0.00|
     ---------+--------+--------+--------+--------+
     11-20    |      17|       1|       3|       0|      4
              |       .|    1.96|    5.88|    0.00|   7.84
              |       .|   25.00|   75.00|    0.00|
              |       .|    2.63|   25.00|    0.00|
     ---------+--------+--------+--------+--------+
     21-50    |      23|       7|       2|       1|     10
              |       .|   13.73|    3.92|    1.96|  19.61
              |       .|   70.00|   20.00|   10.00|
              |       .|   18.42|   16.67|  100.00|
     ---------+--------+--------+--------+--------+
     >50      |      16|      30|       1|       0|     31
              |       .|   58.82|    1.96|    0.00|  60.78
              |       .|   96.77|    3.23|    0.00|
              |       .|   78.95|    8.33|    0.00|
     ---------+--------+--------+--------+--------+
     TOTAL           .       38       12        1      51
                     .    74.51    23.53     1.96  100.00
```

Table 246. Number and percent of institutions having various numbers of science faculty, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                     TABLE OF SFFT78 BY ACCFAC

SFFT78     NUM FULLTIME FACULTY IN SCIENCE 78-79     ACCFAC      CO

FREQUENCY|
PERCENT  |Science Faculty Have Access to a Computer
ROW PCT  |
COL PCT  |   .    |YES     |NO      |  TOTAL
---------+--------+--------+--------+
    .    |     29 |     36 |      2 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-10     |     31 |      9 |      1 |     10
         |      . |   9.47 |   1.05 |  10.53
         |      . |  90.00 |  10.00 |
         |      . |  10.11 |  16.67 |
---------+--------+--------+--------+
11-20    |      4 |     11 |      2 |     13
         |      . |  11.58 |   2.11 |  13.68
         |      . |  84.62 |  15.38 |
         |      . |  12.36 |  33.33 |
---------+--------+--------+--------+
21-50    |     10 |     24 |      2 |     26
         |      . |  25.26 |   2.11 |  27.37
         |      . |  92.31 |   7.69 |
         |      . |  26.97 |  33.33 |
---------+--------+--------+--------+
>50      |      5 |     45 |      1 |     46
         |      . |  47.37 |   1.05 |  48.42
         |      . |  97.83 |   2.17 |
         |      . |  50.56 |  16.67 |
---------+--------+--------+--------+
TOTAL           .       89        6       95
                .    93.68     6.32   100.00
```

Number of Fulltime Science Faculty, 1978-79

Table 247. Number and percent of institutions having various numbers of fulltime science faculty, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                TABLE OF SFTE78 BY ACCFAC

SFTE78     FACULTY IN SCIENCE 78-79    ACCFAC     COMP FACILITIE

FREQUENCY|
PERCENT  |Science Faculty Have Access to a Computer
ROW PCT  |
COL PCT  |   .     |YES      |NO       |  TOTAL
---------+---------+---------+---------+
    .    |      21 |      37 |       2 |      .
         |       . |       . |       . |      .
         |       . |       . |       . |
         |       . |       . |       . |
---------+---------+---------+---------+
0-10     |      33 |       8 |       1 |      9
         |       . |    8.51 |    1.06 |   9.57
         |       . |   88.89 |   11.11 |
         |       . |    9.09 |   16.67 |
---------+---------+---------+---------+
11-20    |       5 |      14 |       2 |     16
         |       . |   14.89 |    2.13 |  17.02
         |       . |   87.50 |   12.50 |
         |       . |   15.91 |   33.33 |
---------+---------+---------+---------+
21-50    |       7 |      24 |       2 |     26
         |       . |   25.53 |    2.13 |  27.66
         |       . |   92.31 |    7.69 |
         |       . |   27.27 |   33.33 |
---------+---------+---------+---------+
>50      |       4 |      42 |       1 |     43
         |       . |   44.68 |    1.06 |  45.74
         |       . |   97.67 |    2.33 |
         |       . |   47.73 |   16.67 |
---------+---------+---------+---------+
TOTAL          .        88         6        94
               .     93.62      6.38    100.00
```

Number of Science Faculty, 1978-79

Table 248. Number and percent of institutions having various numbers of science faculty, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

unrelated to the size of science faculties in responding minority institutions. Contingency coefficients associated with these tables are only 0.19 and 0.16, respectively.

Finally, based on the reports of academic vice presidents/deans, there are modestly positive relationships between the probability that an institution has a computer located on its campus and the size of its science faculty, measured in terms of total faculty members or number of full-time equivalent faculty members (See Tables 249 and 250, and note associated contingency coefficients of 0.30 and 0.33). Once again, the probability associated with the computer access variable increases markedly when the size of the science faculty exceeds ten.

F. Relationships Between the Size of Science Faculties and the Computing Skills of Students and Faculty in the Sciences

In this section we discuss analyses that bear on relationships between the reported size of faculties in the sciences (as measured by total number of science faculty and number of full-time equivalent science faculty), and the reports of science department heads in minority institutions on the computing skills and capabilities of their students and faculty. If we find that science faculty and students are reported to have greater computing skills and capabilities in institutions with larger science faculties, another link between investment in science and computing will have been established. However, no causal argument can be supported by the data available, since directionality is not clear.

Tables 251 through 258 display relationships between academic vice presidents/deans reports of the number of science faculty in their institutions (total and full-time equivalent), and science departments heads' reports on the computing skills and capabilities of students who were newly enrolled in their

```
                    TABLE OF SFFT78 BY CAMPCOMP

SFFT78    NUM FULLTIME FACULTY IN SCIENCE 78-79   CAMPCOMP  IS

FREQUENCY|
 PERCENT |          Computer is Located on Campus
 ROW PCT |
 COL PCT |         |YES     |NO      |
         |    .    |        |        |  TOTAL
---------+---------+--------+--------+
    .    |       1 |      3 |      1 |      .
         |       . |      . |      . |      .
         |       . |      . |      . |
         |       . |      . |      . |
---------+---------+--------+--------+
0-10     |      12 |     12 |      8 |     20
         |       . |  18.18 |  12.12 |  30.30
         |       . |  60.00 |  40.00 |
         |       . |  23.08 |  57.14 |
---------+---------+--------+--------+
11-20    |       0 |     10 |      1 |     11
         |       . |  15.15 |   1.52 |  16.67
         |       . |  90.91 |   9.09 |
         |       . |  19.23 |   7.14 |
---------+---------+--------+--------+
21-50    |       0 |     15 |      3 |     18
         |       . |  22.73 |   4.55 |  27.27
         |       . |  83.33 |  16.67 |
         |       . |  28.85 |  21.43 |
---------+---------+--------+--------+
>50      |       0 |     15 |      2 |     17
         |       . |  22.73 |   3.03 |  25.76
         |       . |  88.24 |  11.76 |
         |       . |  28.85 |  14.29 |
---------+---------+--------+--------+
TOTAL            .       52       14       66
                 .    78.79    21.21   100.00
```

Number of Fulltime Science Faculty, 1978-79

Table 249. Number and percent of institutions having various numbers of fulltime science faculty, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                TABLE OF SFTE78 BY CAMPCOMP

SFTE78    FACULTY IN SCIENCE 78-79   CAMPCOMP  IS COMPUTER ON

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |         |YES     |NO      |
         |       . |        |        |  TOTAL
---------+---------+--------+--------+
    .    |       1 |      4 |      1 |      .
         |       . |      . |      . |      .
         |       . |      . |      . |
         |       . |      . |      . |
---------+---------+--------+--------+
0-10     |      12 |     10 |      8 |     18
         |       . |  15.38 |  12.31 |  27.69
         |       . |  55.56 |  44.44 |
         |       . |  19.61 |  57.14 |
---------+---------+--------+--------+
11-20    |       0 |     12 |      2 |     14
         |       . |  18.46 |   3.08 |  21.54
         |       . |  85.71 |  14.29 |
         |       . |  23.53 |  14.29 |
---------+---------+--------+--------+
21-50    |       0 |     16 |      2 |     18
         |       . |  24.62 |   3.08 |  27.69
         |       . |  88.89 |  11.11 |
         |       . |  31.37 |  14.29 |
---------+---------+--------+--------+
>50      |       0 |     13 |      2 |     15
         |       . |  20.00 |   3.08 |  23.08
         |       . |  86.67 |  13.33 |
         |       . |  25.49 |  14.29 |
---------+---------+--------+--------+
TOTAL            .       51       14       65
                 .    78.46    21.54   100.00
```

Computer is Located on Campus

Number of Science Faculty, 1978-79

Table 250. Number and percent of institutions having various numbers of science faculty, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

departments in the fall of 1978. From Tables 251 and 252 we see that there is a modest negative relationship between the size of science faculties and the percentage of newly enrolled science students with no computer training or skills. The associated contingency coefficients are 0.37 and 0.36. Very slight positive relationships between the size of science faculties and the percentage of newly enrolled science students with general awareness of computers are exhibited by the data in Tables 253 and 254. The major contrast is between institutions reported to have no more than 10 science faculty and those reported to have more than that number. Contingency coefficients associated with these tables are 0.29 and 0.38, respectively. The distributions shown in Tables 255 and 256 suggest that the percentage of newly enrolled science students with limited personal computer use and skill is somewhat higher in institutions with more than 10 science faculty members than in institutions with fewer than that number. The increases are not dramatic, however, and associated contingency coefficients are only 0.23 and 0.22. The percentages of newly enrolled science students who can program a computer increases monotonically as a function of the size of an institution's science faculty (See Tables 257 and 258), but relationships between these variables are modest at best. Associated contingency coefficients are 0.29 for both tables. Since the size-of-science-faculty variables and the variables reflecting the computing skills of newly enrolled students have a natural temporal ordering implicit in their definitions, it is reasonable to assert, on the basis of these data, that institutions with larger science faculties tend to attract students with higher levels of computing skill on entry.

Relationships between the size of science faculties and the computing skills and capabilities of currently enrolled students (as reported by heads of science departments) are examined in Tables 259 through 266. From

Number of Fulltime Science Faculty, 1978-79

Percent of Newly Entering Students with no Computer Training or Skills

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	5 . . .	6 . . .	3 . . .	3 . . .	5 . . .	16 . . .	. .
0-10	32 . . .	0 0,00 0,00 0,00	1 1,12 11,11 6,67	1 1,12 11,11 12,50	0 0,00 0,00 0,00	1 1,12 11,11 7,69	6 6,74 66,67 17,14	9 10,11
11-20	4 . . .	0 0,00 0.00 0,00	3 3,37 23,08 20,00	1 1,12 7,69 12,50	1 1,12 7,69 16,67	2 2,25 15,38 15,38	6 6,74 46,15 17,14	13 14.61
21-50	12 . . .	2 2,25 8,33 16,67	3 3,37 12,50 20.00	3 3.37 12,50 37,50	2 2,25 8,33 33,33	2 2,25 8,33 15,38	12 13,48 50,00 34,29	24 26,97
>50	8 . . .	10 11,24 23,26 83,33	8 8,99 18,60 53,33	3 3,37 6,98 37,50	3 3,37 6,98 50,00	8 8,99 18,60 61,54	11 12,36 25,58 31,43	43 48,31
TOTAL	. .	12 13.48	15 16.85	8 8,99	6 6,74	13 14,61	35 39,33	89 100,00

Table 251. Number and percent of institutions having various numbers of fulltime science faculty, by institutions with various percents of newly entering students with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Newly Entering Students with no Computer Training or Skills

Number of Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	21 . . .	5 . . .	6 . . .	3 . . .	3 . . .	5 . . .	17 . . .	. .
0-10	33 . . .	0 0.00 0.00 0.00	1 1.14 11.11 6.67	1 1.14 11.11 12.50	0 0.00 0.00 0.00	1 1.14 11.11 7.69	6 6.82 66.67 17.65	9 10.23
11-20	6 . . .	1 1.14 6.67 8.33	4 4.55 26.67 26.67	2 2.27 13.33 25.00	1 1.14 6.67 16.67	2 2.27 13.33 15.38	5 5.68 33.33 14.71	15 17.05
21-50	9 . . .	3 3.41 12.50 25.00	2 2.27 8.33 13.33	3 3.41 12.50 37.50	2 2.27 8.33 33.33	2 2.27 8.33 15.38	12 13.64 50.00 35.29	24 27.27
>50	7 . . .	8 9.09 20.00 66.67	8 9.09 20.00 53.33	2 2.27 5.00 25.00	3 3.41 7.50 50.00	8 9.09 20.00 61.54	11 12.50 27.50 32.35	40 45.45
TOTAL	. .	12 13.64	15 17.05	8 9.09	6 6.82	13 14.77	34 38.64	88 100.00

Table 252. Number and percent of institutions having various numbers of science faculty, by institutions with various percents of newly entering students with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Newly Entering Students with General Awareness of Computers

Number of Fulltime Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	9 . . .	13 . . .	3 . . .	4 . . .	3 . . .	6 . . .	. .
0-10	32 . . .	3 3,37 33,33 17,65	4 4.49 44,44 12.12	0 0,00 0,00 0.00	0 0.00 0.00 0.00	1 1,12 11,11 14.29	1 1,12 11,11 7,14	9 10,11
11-20	4 . . .	3 3,37 23,08 17.65	5 5.62 38.46 15,15	1 1,12 7.69 11,11	2 2.25 15,38 22,22	0 0,00 0.00 0,00	2 2.25 15,38 14,29	13 14.61
21-50	12 . . .	4 4.49 16,67 23,53	9 10,11 37,50 27,27	4 4.49 16,67 44,44	3 3,37 12.50 33,33	2 2.25 8.33 28,57	2 2.25 8.33 14,29	24 26.97
>50	8 . . .	7 7,87 16,28 41,18	15 16,85 34,88 45.45	4 4.49 9,30 44,44	4 4.49 9.30 44,44	4 4,49 9,30 57,14	9 10,11 20,93 64,29	43 48,31
TOTAL	. .	17 19,10	33 37.08	9 10,11	9 10.11	7 7,87	14 15,73	89 100,00

Table 253. Number and percent of institutions having various numbers of fulltime science faculty, by institutions with various percents of newly entering students with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Science Faculty, 1978-79

```
FREQUENCY|
PERCENT  |   Percent of Newly Entering Students with General Awareness of Computers
ROW PCT  |
COL PCT  |        .|        0|1%-20%   |21%-40%  |41%-60%  |61%-80%  |81%-100%|  TOTAL
---------+---------+---------+---------+---------+---------+---------+---------+
    .    |      21 |       9 |      14 |       3 |       4 |[illegible]|     6 |      .
         |       . |       . |       . |       . |       . |       . |       . |      .
         |       . |       . |       . |       . |       . |       . |       . |
         |       . |       . |       . |       . |       . |       . |       . |
---------+---------+---------+---------+---------+---------+---------+---------+
0-10     |      33 |       3 |       4 |       0 |       0 |       1 |       1 |      9
         |       . |    3,41 |    4.55 |    0.00 |    0,00 |    1.14 |    1.14 |  10.23
         |       . |   33.33 |   44.44 |    0.00 |    0.00 |   11.11 |   11.11 |
         |       . |   17.65 |   12.50 |    0.00 |    0.00 |   14.29 |    7.14 |
---------+---------+---------+---------+---------+---------+---------+---------+
11-20    |       6 |       1 |       6 |       1 |       4 |       0 |       3 |     15
         |       . |    1.14 |    6.82 |    1.14 |    4.55 |    0,00 |    3.41 |  17.05
         |       . |    6.67 |   40.00 |    6.67 |   26.67 |    0,00 |   20,00 |
         |       . |    5.88 |   18.75 |   11.11 |   44.44 |    0.00 |   21.43 |
---------+---------+---------+---------+---------+---------+---------+---------+
21-50    |       9 |       6 |       7 |       5 |       1 |       2 |       3 |     24
         |       . |    6.82 |    7.95 |    5.68 |    1.14 |    2,27 |    3.41 |  27.27
         |       . |   25.00 |   29.17 |   20.83 |    4.17 |    8.33 |   12.50 |
         |       . |   35.29 |   21.88 |   55.56 |   11.11 |   28.57 |   21.43 |
---------+---------+---------+---------+---------+---------+---------+---------+
>50      |       7 |       7 |      15 |       3 |       4 |       4 |       7 |     40
         |       . |    7.95 |   17.05 |    3.41 |    4.55 |    4.55 |    7.95 |  45.45
         |       . |   17.50 |   37.50 |    7.50 |   10.00 |   10.00 |   17.50 |
         |       . |   41.18 |   46.88 |   33.33 |   44.44 |   57.14 |   50.00 |
---------+---------+---------+---------+---------+---------+---------+---------+
TOTAL            .        17        32         9         9         7        14       88
                 .     19.32     36.36     10.23     10.23      7.95     15.91   100.00
```

Table 254. Number and percent of institutions having various numbers of science faculty, by institutions with various percents of newly entering students with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M

                         TABLE OF SFFT78 BY NEWSKL3

SFFT78     NUM FULLTIME FACULTY IN SCIENCE 78-79     NEWSKL:

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |        .|        0|1%-20%  |21%-40% |  TOTAL
---------+---------+---------+---------+--------+
     .   |      20 |      17 |      19 |      2 |      .
         |       . |       . |       . |      . |      .
         |       . |       . |       . |      . |
         |       . |       . |       . |      . |
---------+---------+---------+---------+--------+
0-10     |      32 |       6 |       3 |      0 |      9
         |       . |    6.74 |    3.37 |   0.00 |  10.11
         |       . |   66.67 |   33.33 |   0.00 |
         |       . |   16.67 |    6.82 |   0.00 |
---------+---------+---------+---------+--------+
11-20    |       4 |       7 |       5 |      1 |     13
         |       . |    7.87 |    5.62 |   1.12 |  14.61
         |       . |   53.85 |   38.46 |   7.69 |
         |       . |   19.44 |   11.36 |  11.11 |
---------+---------+---------+---------+--------+
21-50    |      12 |       8 |      13 |      3 |     24
         |       . |    8.99 |   14.61 |   3.37 |  26.97
         |       . |   33.33 |   54.17 |  12.50 |
         |       . |   22.22 |   29.55 |  33.33 |
---------+---------+---------+---------+--------+
>50      |       8 |      15 |      23 |      5 |     43
         |       . |   16.85 |   25.84 |   5.62 |  48.31
         |       . |   34.88 |   53.49 |  11.63 |
         |       . |   41.67 |   52.27 |  55.56 |
---------+---------+---------+---------+--------+
TOTAL            .        36        44        9       89
                 .     40.45     49.44    10.11   100.00
```

Percent of Newly Entering Students with
<u>Limited Personal Computer Use and Skill</u>

Number of Fulltime Science Faculty, 1978-79

Table 255. Number and percent of institutions having various numbers of fulltime science faculty, by institutions with various percents of newly entering students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                        TABLE OF SFTE78 BY NEWSKL3

SFTE78    FACULTY IN SCIENCE 78-79    NEWSKL3    PERC NEW

FREQUENCY|      Percent of Newly Entering Students with
PERCENT  |      Limited Personal Computer Use and Skill
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |  TOTAL
---------+--------+--------+--------+--------+
    .    |     21 |     18 |     19 |      2 |      .
         |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |
         |      . |      . |      . |      . |
---------+--------+--------+--------+--------+
0-10     |     33 |      6 |      3 |      0 |      9
         |      . |   6.82 |   3.41 |   0.00 |  10.23
         |      . |  66.67 |  33.33 |   0.00 |
         |      . |  17.14 |   6.82 |   0.00 |
---------+--------+--------+--------+--------+
11-20    |      6 |      6 |      7 |      2 |     15
         |      . |   6.82 |   7.95 |   2.27 |  17.05
         |      . |  40.00 |  46.67 |  13.33 |
         |      . |  17.14 |  15.91 |  22.22 |
---------+--------+--------+--------+--------+
21-50    |      9 |     10 |     11 |      3 |     24
         |      . |  11.36 |  12.50 |   3.41 |  27.27
         |      . |  41.67 |  45.83 |  12.50 |
         |      . |  28.57 |  25.00 |  33.33 |
---------+--------+--------+--------+--------+
>50      |      7 |     13 |     23 |      4 |     40
         |      . |  14.77 |  26.14 |   4.55 |  45.45
         |      . |  32.50 |  57.50 |  10.00 |
         |      . |  37.14 |  52.27 |  44.44 |
---------+--------+--------+--------+--------+
TOTAL           .       35       44        9       88
                .    39.77    50.00    10.23   100.00
```

Number of Science Faculty, 1978-79

Table 256. Number and percent of institutions having various numbers of science faculty, by institutions with various percents of newly entering students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Newly Entering Students with Ability to Program a Computer						
Number of Fulltime Science Faculty, 1978-79	.	0	1%-20%	21%-40%	41%-60%	81%-100%	TOTAL
.	20 . . .	26 . . .	12 . . .	0 . . .	0 . . .	0 . . .	. .
0-10	32 . . .	7 7.87 77.78 14.58	2 2.25 22.22 5.41	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	9 10.11
11-20	4 . . .	8 8.99 61.54 16.67	4 4.49 30.77 10.81	1 1.12 7.69 50.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	13 14.61
21-50	12 . . .	14 15.73 58.33 29.17	10 11.24 41.67 27.03	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	24 26.97
>50	8 . . .	19 21.35 44.19 39.58	21 23.60 48.84 56.76	1 1.12 2.33 50.00	1 1.12 2.33 100.00	1 1.12 2.33 100.00	43 48.31
TOTAL	. .	48 53.93	37 41.57	2 2.25	1 1.12	1 1.12	89 100.00

Table 257. Number and percent of institutions having various numbers of fulltime science faculty, by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Newly Entering Students with Ability to Program a Computer

Number of Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	81%-100%	TOTAL
.	21 . . .	27 . . .	12 . . .	0 . . .	0 . . .	0 . . .	. .
0-10	33 . . .	6 6.82 66.67 12.77	3 3.41 33.33 8.11	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	9 10.23
11-20	6 . . .	10 11.36 66.67 21.28	4 4.55 26.67 10.81	1 1.14 6.67 50.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	15 17.05
21-50	9 . . .	14 15.91 58.33 29.79	10 11.36 41.67 27.03	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	24 27.27
>50	7 . . .	17 19.32 42.50 36.17	20 22.73 50.00 54.05	1 1.14 2.50 50.00	1 1.14 2.50 100.00	1 1.14 2.50 100.00	40 45.45
TOTAL	. .	47 53.41	37 42.05	2 2.27	1 1.14	1 1.14	88 100.00

Table 258. Number and percent of institutions having various numbers of science faculty, by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

492

Tables 259 and 260 we see that there is a modest negative relationship between the size of science faculties and the percentage of currently enrolled students reported to have no computer training or skills. Percentages of science students with no computer training or skills are markedly lower in institutions with more than 50 science faculty (either total or full-time equivalent). Associated contingency coefficients are 0.44 and 0.42, respectively. As Tables 261 and 262 illustrate, there is a slight positive relationship between the size of science faculties and the percentage of currently enrolled science students reported to have general awareness of computers. For this variable, there appears to be a noteworthy difference between reported percentages for institutions with at least 21 science faculty and for those with no more than 20 science faculty. Contingency coefficients associated with these tables are 0.38 and 0.39, respectively. The percentage of currently enrolled science students reported to have limited personal computer use and skill is somewhat higher in institutions with at least 21 science faculty members (either total or full-time equivalent), as shown by the data in Tables 263 and 264. The relationships shown in these tables have associated contingency coefficients of 0.37 and would have to be termed modest. The percentage of currently enrolled science students reported to be able to program a computer is markedly higher in institutions with at least 21 science faculty members (either total or full-time equivalent), and increases monotonically as a function of the number of science faculty members employed by the institution. Almost a fourth of the institutions with more than 50 science faculty report that more than 40 percent of their currently enrolled science students can program a computer. The data underlying these conclusions are shown in Tables 265 and 266, and have associated contingency coefficients of 0.38 and 0.40, respectively.

Percent of Currently Enrolled Students with No Computer Training or Skills

Number of Fulltime Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	10	8	4	3	6	7	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-10	32	0	1	2	2	3	1	9
	.	0.00	1.10	2.20	2.20	3.30	1.10	9.89
	.	0.00	11.11	22.22	22.22	33.33	11.11	
	.	0.00	5.26	11.76	22.22	33.33	7.69	
11-20	4	3	2	2	2	0	4	13
	.	3.30	2.20	2.20	2.20	0.00	4.40	14.29
	.	23.08	15.38	15.38	15.38	0.00	30.77	
	.	12.50	10.53	11.76	22.22	0.00	30.77	
21-50	12	5	4	4	3	3	5	24
	.	5.49	4.40	4.40	3.30	3.30	5.49	26.37
	.	20.83	16.67	16.67	12.50	12.50	20.83	
	.	20.83	21.05	23.53	33.33	33.33	38.46	
>50	6	16	12	9	2	3	3	45
	.	17.58	13.19	9.89	2.20	3.30	3.30	49.45
	.	35.56	26.67	20.00	4.44	6.67	6.67	
	.	66.67	63.16	52.94	22.22	33.33	23.08	
TOTAL	.	24	19	17	9	9	13	91
	.	26.37	20.88	18.68	9.89	9.89	14.29	100.00

Table 259. Number and percent of institutions having various numbers of fulltime science faculty, by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Currently Enrolled Students with No Computer Training or Skills							
	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	21 . . .	10 . . .	8 . . .	4 . . .	3 . . .	6 . . .	8 . . .	. .
0-10	33 . . .	0 0,00 0,00 0,00	1 1,11 11,11 5,26	2 2,22 22,22 11,76	2 2,22 22,22 22,22	3 3,33 33,33 33,33	1 1,11 11,11 8,33	9 10,00
11-20	6 . . .	4 4,44 26,67 16,67	3 3,33 20,00 15,79	2 2,22 13,33 11,76	3 3,33 20,00 33,33	1 1,11 6,67 11,11	2 2,22 13,33 16,67	15 16,67
21-50	9 . . .	6 6,67 25,00 25,00	3 3,33 12,50 15,79	5 5,56 20,83 29,41	2 2,22 8,33 22,22	2 2,22 8,33 22,22	6 6,67 25,00 50,00	24 26,67
>50	5 . . .	14 15,56 33,33 58,33	12 13,33 28,57 63,16	8 8,89 19,05 47,06	2 2,22 4,76 22,22	3 3,33 7,14 33,33	3 3,33 7,14 25,00	42 46,67
TOTAL	. .	24 26,67	19 21,11	17 18,89	9 10,00	9 10,00	12 13,33	90 100,00

Table 260. Number and percent of institutions having various numbers of science faculty, by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Fulltime Science Faculty, 1978-79	Percent of Currently Enrolled Students with General Awareness of Computers							
FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	8 . . .	16 . . .	5 . . .	5 . . .	3 . . .	1 . . .	. .
0-10	32 . . .	2 2.20 22.22 12.50	3 3.30 33.33 9.68	2 2.20 22.22 8.70	0 0.00 0.00 0.00	2 2.20 22.22 25.00	0 0.00 0.00 0.00	9 9.89
11-20	4 . . .	4 4.40 30.77 25.00	5 5.49 38.46 16.13	2 2.20 15.38 8.70	1 1.10 7.69 11.11	0 0.00 0.00 0.00	1 1.10 7.69 25.00	13 14.29
21-50	12 . . .	3 3.30 12.50 18.75	9 9.89 37.50 29.03	10 10.99 41.67 43.48	1 1.10 4.17 11.11	1 1.10 4.17 12.50	0 0.00 0.00 0.00	24 26.37
>50	6 . . .	7 7.69 15.56 43.75	14 15.38 31.11 45.16	9 9.89 20.00 39.13	7 7.69 15.56 77.78	5 5.49 11.11 62.50	3 3.30 6.67 75.00	45 49.45
TOTAL	. .	16 17.58	31 34.07	23 25.27	9 9.89	8 8.79	4 4.40	91 100.00

Table 261. Number and percent of institutions having various numbers of fulltime science faculty, by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Currently Enrolled Students with General Awareness of Computers

Number of Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	21 . . .	8 . . .	17 . . .	5 . . .	5 . . .	3 . . .	1 . . .	. .
0-10	33 . . .	2 2,22 22,22 12,50	3 3,33 33,33 10,00	2 2,22 22,22 8,70	0 0,00 0,00 0,00	2 2,22 22,22 25,00	0 0,00 0,00 0,00	9 10,00
11-20	6 . . .	4 4,44 26,67 25,00	4 4,44 26,67 13,33	4 4,44 26,67 17,39	1 1,11 6,67 11,11	0 0,00 0,00 0,00	2 2,22 13,33 50,00	15 16,67
21-50	9 . . .	3 3,33 12,50 18,75	10 11,11 41,67 33,33	9 10,00 37,50 39,13	1 1,11 4,17 11,11	1 1,11 4,17 12,50	0 0,00 0,00 0,00	24 26,67
>50	5 . . .	7 7,78 16,67 43,75	13 14,44 30,95 43,33	8 8,89 19,05 34,78	7 7,78 16,67 77,78	5 5,56 11,90 62,50	2 2,22 4,76 50,00	42 46,67
TOTAL	. .	16 17,78	30 33,33	23 25,56	9 10,00	8 8,89	4 4,44	90 100,00

Table 262. Number and percent of institutions having various numbers of science faculty, by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Fulltime Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Currently Enrolled Students with Limited Personal Computer Use and Skill							
	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	9	21	3	2	1	2	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-10	32	3	5	0	1	0	0	9
	.	3.30	5.49	0.00	1.10	.	0.00	9.89
	.	33.33	55.56	0.00	11.11	.	0.00	
	.	17.65	9.80	0.00	14.29	.	0.00	
11-20	4	6	5	1	1	0	0	13
	.	6.59	5.49	1.10	1.10	.	0.00	14.29
	.	46.15	38.46	7.69	7.69	.	0.00	
	.	35.29	9.80	7.14	14.29	.	0.00	
21-50	12	3	13	6	1	0	1	24
	.	3.30	14.29	6.59	1.10	.	1.10	26.37
	.	12.50	54.17	25.00	4.17	.	4.17	
	.	17.65	25.49	42.86	14.29	.	50.00	
>50	6	5	28	7	4	0	1	45
	.	5.49	30.77	7.69	4.40	.	1.10	49.45
	.	11.11	62.22	15.56	8.89	.	2.22	
	.	29.41	54.90	50.00	57.14	.	50.00	
TOTAL	.	17	51	14	7	.	2	91
	.	18.68	56.04	15.38	7.69	.	2.20	100.00

Table 263. Number and percent of institutions having various numbers of fulltime science faculty, by institutions with various percents of currently enrolled students with limited personal computer use or skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Currently Enrolled Students with Limited Personal Computer Use and Skill							
	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	21 . . .	10 . . .	21 . . .	3 . . .	2 . . .	1 . . .	2 . . .	. .
0-10	33 . . .	3 3.33 33.33 18.75	5 5.56 55.56 9.80	0 0.00 0.00 0.00	1 1.11 11.11 14.29	0 . . .	0 0.00 0.00 0.00	9 10.00
11-20	6 . . .	6 6.67 40.00 37.50	5 5.56 33.33 9.80	3 3.33 20.00 21.43	1 1.11 6.67 14.29	0 . . .	0 0.00 0.00 0.00	15 16.67
21-50	9 . . .	3 3.33 12.50 18.75	13 14.44 54.17 25.49	6 6.67 25.00 42.86	1 1.11 4.17 14.29	0 . . .	1 1.11 4.17 50.00	24 26.67
>50	5 . . .	4 4.44 9.52 25.00	28 31.11 66.67 54.90	5 5.56 11.90 35.71	4 4.44 9.52 57.14	0 . . .	1 1.11 2.38 50.00	42 46.67
TOTAL	. .	16 17.78	51 56.67	14 15.56	7 7.78	. .	2 2.22	90 100.00

Table 264. Number and percent of institutions having various numbers of science faculty, by institutions with various percents of currently enrolled students with limited personal computer use or skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Fulltime Science Faculty, 1978-79

Percent of Currently Enrolled Students with Ability to Program a Computer

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	12 . . .	15 . . .	5 . . .	4 . . .	1 . . .	1 . . .	. .
0-10	32 . . .	3 3.30 33.33 13.64	6 6.59 66.67 13.95	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	9 9.89
11-20	4 . . .	5 5.49 38.46 22.73	5 5.49 38.46 11.63	1 1.10 7.69 9.09	1 1.10 7.69 14.29	0 0.00 0.00 0.00	1 1.10 7.69 25.00	13 14.29
21-50	12 . . .	6 6.59 25.00 27.27	10 10.99 41.67 23.26	6 6.59 25.00 54.55	2 2.20 8.33 28.57	0 0.00 0.00 0.00	0 0.00 0.00 0.00	24 26.37
>50	6 . . .	8 8.79 17.78 36.36	22 24.18 48.89 51.16	4 4.40 8.89 36.36	4 4.40 8.89 57.14	4 4.40 8.89 100.00	3 3.30 6.67 75.00	45 49.45
TOTAL	. .	22 24.18	43 47.25	11 12.09	7 7.69	4 4.40	4 4.40	91 100.00

Table 265. Number and percent of institutions having various numbers of fulltime science faculty, by institutions with various percents of currently entering students with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Science Faculty, 1978-79

```
FREQUENCY|
PERCENT  |       Percent of Currently Enrolled Students with Ability to Program a Computer
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+
     .   |     21 |     13 |     15 |      5 |      4 |      1 |      1 |     .
         |      . |      . |      . |      . |      . |      . |      . |     .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |     33 |      3 |      6 |      0 |      0 |      0 |      0 |      9
         |      . |   3.33 |   6.67 |   0.00 |   0.00 |   0.00 |   0.00 |  10.00
         |      . |  33.33 |  66.67 |   0.00 |   0.00 |   0.00 |   0.00 |
         |      . |  14.29 |  13.95 |   0.00 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
11-20    |      6 |      5 |      6 |      2 |      1 |      0 |      1 |     15
         |      . |   5.56 |   6.67 |   2.22 |   1.11 |   0.00 |   1.11 |  16.67
         |      . |  33.33 |  40.00 |  13.33 |   6.67 |   0.00 |   6.67 |
         |      . |  23.81 |  13.95 |  18.18 |  14.29 |   0.00 |  25.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
21-50    |      9 |      6 |      9 |      6 |      3 |      0 |      0 |     24
         |      . |   6.67 |  10.00 |   6.67 |   3.33 |   0.00 |   0.00 |  26.67
         |      . |  25.00 |  37.50 |  25.00 |  12.50 |   0.00 |   0.00 |
         |      . |  28.57 |  20.93 |  54.55 |  42.86 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>50      |      5 |      7 |     22 |      3 |      3 |      4 |      3 |     42
         |      . |   7.78 |  24.44 |   3.33 |   3.33 |   4.44 |   3.33 |  46.67
         |      . |  16.67 |  52.38 |   7.14 |   7.14 |   9.52 |   7.14 |
         |      . |  33.33 |  51.16 |  27.27 |  42.86 | 100.00 |  75.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL             .       21       43       11        7        4        4       90
                  .    23.33    47.78    12.22     7.78     4.44     4.44   100.00
```

Table 266. Number and percent of institutions having various numbers of science faculty, by institutions with various percents of currently entering students with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Tables 267 through 274 illustrate relationships between the sizes of science faculties and the computing capabilities and skills of science faculty, as reported by heads of science departments in minority institutions. From Tables 267 and 268 we can see that there are no consistent relationships between the sizes of science faculties and the reported percentages of science faculty with no computer training or skills. Some few institutions with 11 to 20 science faculty report that relatively large percentages of their science faculty have no computer training or skills, but the total number of responding institutions in that category is quite small. Data shown in Tables 269 and 270 suggest some tendency for the percentages of faculty with general awareness of computers to be higher in institutions with no more than 20 science faculty members than in institutions with at least 21 science faculty. The contingency coefficients associated with these tables are 0.41 and 0.39, respectively. Institutions with larger numbers of science faculty members have a somewhat higher percentage of science faculty members reported to have limited personal computer use and skill, but the relationships between these variables is modest (See Tables 271 and 272, and note associated contingency coefficients of 0.27 and 0.24). Percentages of science faculty reported to be able to program a computer are inconsistently related to the sizes of science faculties in their institutions. Data shown in Tables 273 and 274 suggest a slight relative deficiency in programming skills among science faculty in institutions with 11 to 20 full-time equivalent science faculty members, but the small number of institutions in this category makes conclusion speculative at best.

G. Relationships Between the Size of Science Faculties, and Science Faculty Use of Computers

Relationships between the percentages of science faculty reported to use computers for various academic purposes and the sizes of science faculties are

Number of Fulltime Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
			Percent of Faculty with No Computer Training or Skills					
.	20 . . .	26 . . .	6 . . .	3 . . .	2 . . .	1 . . .	0 . . .	. .
0-10	31 . . .	6 6,45 60,00 10,71	1 1,08 10,00 9,09	2 2,15 20,00 18,18	1 1,08 10,00 16,67	0 0,00 0,00 0,00	0 0,00 0,00 0,00	10 10,75
11-20	4 . . .	6 6,45 46,15 10,71	2 2,15 15,38 18,18	1 1,08 7,69 9,09	1 1,08 7,69 16,67	2 2,15 15,38 40,00	1 1,08 7,69 25,00	13 13,98
21-50	12 . . .	15 16,13 62,50 26,79	3 3,23 12,50 27,27	2 2,15 8,33 18,18	1 1,08 4,17 16,67	2 2,15 8,33 40,00	1 1,08 4,17 25,00	24 25,81
>50	5 . . .	29 31,18 63,04 51,79	5 5,38 10,87 45,45	6 6,45 13,04 54,55	3 3,23 6,52 50,00	1 1,08 2,17 20,00	2 2,15 4,35 50,00	46 49,46
TOTAL	. .	56 60,22	11 11,83	11 11,83	6 6,45	5 5,38	4 4,30	93 100,00

Table 267. Number and percent of institutions having various numbers of fulltime science faculty, by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Science Faculty, 1978-79

Percent of Faculty with No Computer Training or Skills

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	21	26	6	3	3	1	0	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-10	33	6	1	1	1	0	0	9
	.	6.52	1.09	1.09	1.09	0.00	0.00	9.78
	.	66.67	11.11	11.11	11.11	0.00	0.00	
	.	10.71	9.09	9.09	20.00	0.00	0.00	
11-20	5	8	1	2	1	2	2	16
	.	8.70	1.09	2.17	1.09	2.17	2.17	17.39
	.	50.00	6.25	12.50	6.25	12.50	12.50	
	.	14.29	9.09	18.18	20.00	40.00	50.00	
21-50	9	14	5	3	0	2	0	24
	.	15.22	5.43	3.26	0.00	2.17	0.00	26.09
	.	58.33	20.83	12.50	0.00	8.33	0.00	
	.	25.00	45.45	27.27	0.00	40.00	0.00	
>50	4	28	4	5	3	1	2	43
	.	30.43	4.35	5.43	3.26	1.09	2.17	46.74
	.	65.12	9.30	11.63	6.98	2.33	4.65	
	.	50.00	36.36	45.45	60.00	20.00	50.00	
TOTAL	.	56	11	11	5	5	4	92
	.	60.87	11.96	11.96	5.43	5.43	4.35	100.00

Table 268. Number and percent of institutions having various numbers of science faculty, by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Fulltime Science Faculty, 1978-79

Percent of Faculty with General Awareness of Computers

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	15	4	7	3	7	2	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-10	31	3	0	2	3	2	0	10
	.	3,23	0,00	2,15	3,23	2,15	0,00	10,75
	.	30,00	0,00	20,00	30.00	20,00	0,00	
	.	15,00	0,00	8,00	18,75	28,57	0,00	
11-20	4	2	4	4	0	2	1	13
	.	2,15	4,30	4,30	0,00	2,15	1,08	13,98
	.	15,38	30,77	30,77	0,00	15,38	7,69	
	.	10,00	16,67	16.00	0,00	28,57	100,00	
21-50	12	5	8	7	4	0	0	24
	.	5,38	8.60	7,53	4,30	0,00	0,00	25,81
	.	20,83	33,33	29,17	16,67	0,00	0,00	
	.	25,00	33,33	28,00	25,00	0,00	0,00	
>50	5	10	12	12	9	3	0	46
	.	10,75	12,90	12,90	9,68	3,23	0,00	49,46
	.	21,74	26,09	26,09	19,57	6,52	0,00	
	.	50,00	50,00	48,00	56,25	42,86	0,00	
TOTAL	.	20	24	25	16	7	1	93
	.	21,51	25,81	26,88	17,20	7,53	1,08	100,00

Table 269. Number and percent of institutions having various numbers of fulltime science faculty, by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Faculty with General Awareness of Computers							
	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	21 . . .	15 . . .	4 . . .	7 . . .	4 . . .	7 . . .	2 . . .	. .
0-10	33 . . .	3 3,26 33,33 15,00	1 1.09 11.11 4.17	1 1.09 11.11 4.00	2 2.17 22,22 13,33	2 2.17 22.22 28,57	0 0,00 0,00 0,00	9 9.78
11-20	5 . . .	1 1,09 6,25 5,00	4 4.35 25.00 16.67	5 5.43 31.25 20,00	3 3,26 18.75 20,00	2 2.17 12.50 28.57	1 1.09 6,25 100,00	16 17.39
21-50	9 . . .	7 7.61 29.17 35,00	7 7.61 29.17 29.17	8 8.70 33.33 32.00	2 2.17 8.33 13.33	0 0.00 0.00 0.00	0 0.00 0.00 0.00	24 26.09
>50	4 . . .	9 9.78 20.93 45.00	12 13.04 27.91 50.00	11 11.96 25.58 44.00	8 8.70 18.60 53.33	3 3.26 6.98 42.86	0 0.00 0.00 0.00	43 46.74
TOTAL	. .	20 21.74	24 26.09	25 27.17	15 16.30	7 7.61	1 1.09	92 100.00

Table 270. Number and percent of institutions having various numbers of science faculty, by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Number of Fulltime Science Faculty, 1978-79

Percent of Faculty with Limited Personal Computer Use and Skill

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	8	18	5	5	0	2	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-10	31	3	4	2	1	0	0	10
	.	3,23	4,30	2,15	1,08	0,00	0.00	10,75
	.	30,00	40,00	20,00	10,00	0,00	0,00	
	.	16,67	11,43	8,33	9,09	0,00	0,00	
11-20	4	4	6	2	1	0	0	13
	.	4,30	6,45	2,15	1,08	0,00	0,00	13,98
	.	30,77	46,15	15,38	7,69	0,00	0,00	
	.	22,22	17,14	8,33	9,09	0,00	0,00	
21-50	12	5	8	6	3	2	0	24
	.	5,38	8,60	6,45	3,23	2,15	0,00	25,81
	.	20,83	33,33	25,00	12,50	8.33	0,00	
	.	27,78	22,86	25,00	27,27	50,00	0,00	
>50	5	6	17	14	6	2	1	46
	.	6,45	18,28	15,05	6.45	2,15	1,08	49,46
	.	13,04	36,96	30,43	13,04	4,35	2.17	
	.	33,33	48,57	58,33	54,55	50,00	100,00	
TOTAL	.	18	35	24	11	4	1	93
	.	19,35	37,63	25,81	11.83	4.30	1,08	100,00

Table 271. Number and percent of institutions having various numbers of fulltime science faculty, by institutions with various percents of faculty with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Faculty with Limited Personal Computer Use and Skill							
Number of Science Faculty, 1978-79	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	21 . . .	9 . . .	18 . . .	5 . . .	5 . . .	0 . . .	2 . . .	. .
0-10	33 . . .	2 2.17 22.22 11.76	5 5.43 55.56 14.29	1 1.09 11.11 4.17	1 1.09 11.11 9.09	0 0.00 0.00 0.00	0 0.00 0.00 0.00	9 9.78
11-20	5 . . .	4 4.35 25.00 23.53	6 6.52 37.50 17.14	4 4.35 25.00 16.67	1 1.09 6.25 9.09	1 1.09 6.25 25.00	0 0.00 0.00 0.00	16 17.39
21-50	9 . . .	5 5.43 20.83 29.41	8 8.70 33.33 22.86	6 6.52 25.00 25.00	4 4.35 16.67 36.36	1 1.09 4.17 25.00	0 0.00 0.00 0.00	24 26.09
>50	4 . . .	6 6.52 13.95 35.29	16 17.39 37.21 45.71	13 14.13 30.23 54.17	5 5.43 11.63 45.45	2 2.17 4.65 50.00	1 1.09 2.33 100.00	43 46.74
TOTAL	. .	17 18.48	35 38.04	24 26.09	11 11.96	4 4.35	1 1.09	92 100.00

Table 272. Number and percent of institutions having various numbers of science faculty, by institutions with various percents of faculty with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Faculty with Ability to Program a Computer

Number of Fulltime Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	7	9	6	7	3	6	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-10	31	1	4	2	1	0	2	10
	.	1.08	4.30	2.15	1.08	0.00	2.15	10.75
	.	10.00	40.00	20.00	10.00	0.00	20.00	
	.	8.33	14.29	7.69	9.09	0.00	16.67	
11-20	4	4	2	4	1	1	1	13
	.	4.30	2.15	4.30	1.08	1.08	1.08	13.98
	.	30.77	15.38	30.77	7.69	7.69	7.69	
	.	33.33	7.14	15.38	9.09	25.00	8.33	
21-50	12	3	9	4	3	0	5	24
	.	3.23	9.68	4.30	3.23	0.00	5.38	25.81
	.	12.50	37.50	16.67	12.50	0.00	20.83	
	.	25.00	32.14	15.38	27.27	0.00	41.67	
>50	5	4	13	16	6	3	4	46
	.	4.30	13.98	17.20	6.45	3.23	4.30	49.46
	.	6.70	28.26	34.78	13.04	6.52	8.70	
	.	33.33	46.43	61.54	54.55	75.00	33.33	
TOTAL	.	12	28	26	11	4	12	93
	.	12.90	30.11	27.96	11.83	4.30	12.90	100.00

Table 273. Number and percent of institutions having various numbers of fulltime science faculty, by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
FREQUENCY|
PERCENT  |         Percent of Faculty with Ability to Program a Computer
ROW PCT  |
COL PCT  |       .|       0|1%-20% |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     21 |      8 |      9 |      6 |      7 |      3 |      6 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |     33 |      1 |      3 |      2 |      1 |      0 |      2 |      9
         |      . |   1.09 |   3.26 |   2.17 |   1.09 |   0.00 |   2.17 |   9.78
         |      . |  11.11 |  33.33 |  22.22 |  11.11 |   0.00 |  22.22 |
         |      . |   9.09 |  10.71 |   7.69 |   9.09 |   0.00 |  16.67 |
---------+--------+--------+--------+--------+--------+--------+--------+
11-20    |      5 |      6 |      5 |      3 |      2 |      0 |      0 |     16
         |      . |   6.52 |   5.43 |   3.26 |   2.17 |   0.00 |   0.00 |  17.39
         |      . |  37.50 |  31.25 |  18.75 |  12.50 |   0.00 |   0.00 |
         |      . |  54.55 |  17.86 |  11.54 |  18.18 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
21-50    |      9 |      1 |      7 |      6 |      3 |      1 |      6 |     24
         |      . |   1.09 |   7.61 |   6.52 |   3.26 |   1.09 |   6.52 |  26.09
         |      . |   4.17 |  29.17 |  25.00 |  12.50 |   4.17 |  25.00 |
         |      . |   9.09 |  25.00 |  23.08 |  27.27 |  25.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>50      |      4 |      3 |     13 |     15 |      5 |      3 |      4 |     43
         |      . |   3.26 |  14.13 |  16.30 |   5.43 |   3.26 |   4.35 |  46.74
         |      . |   6.98 |  30.23 |  34.88 |  11.63 |   6.98 |   9.30 |
         |      . |  27.27 |  46.43 |  57.69 |  45.45 |  75.00 |  33.33 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       11       28       26       11        4       12       92
                .    11.96    30.43    28.26    11.96     4.35    13.04   100.00
```

Table 274. Number and percent of institutions having various numbers of science faculty, by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

illustrated in Tables 275 through 282. Since relationships are generally similar regardless of whether the science-faculty-size variable is represented by the total number of science faculty or the number of full-time equivalent science faculty, no distinction between these indicators will be made in the ensuing discussion. The relationships can be summarized as follows: 1) there is no consistent relationship between the size of science faculties and the percentage of science faculty reported to use computers for facilitating administration of their classes (See Tables 275 and 276); 2) the percentage of faculty reported to use computers for facilitating instruction in their classes is somewhat higher in institutions with at least 21 science faculty and in the smallest institutions (those with no more than 10 science faculty), but the number of responding institutions in the latter category is very small, so conclusions for the smallest institutions must be regarded as tentative (See Tables 277 and 278); 3) the percentage of science faculty reported to use computers as a tool in their research is somewhat higher in institutions with larger numbers of science faculty members, but the relationships between these variables are modest. In a few very small institutions, large percentages of science faculty members are reported to use computers in conjunction with their own research, but numbers of responding institutions in this category (no more than 10 science faculty members) are small, and results must be considered tentative (See Tables 279 and 280); and 4) percentages of faculty reported to use computers for games and experimentation are not consistently related to the number of science faculty employed by their institutions. Although small sample sizes in some faculty-size categories cloud the existence of any patterns, and contingency coefficients of 0.49 and 0.51 suggest lack of independence among these variables, there is no evidence of monotonicity in the data shown in Tables 281 and 282.

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Faculty Having Access [illegible] Computers for Administrative Purposes							
Number of Fulltime Science Faculty, 1978-79	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	25 . . .	18 . . .	6 . . .	4 . . .	4 . . .	1 . . .	0 . . .	. .
0-10	32 . . .	4 4.94 44.44 12.50	2 2.47 22.22 8.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.23 11.11 25.00	2 2.47 22.22 40.00	9 11.11
11-20	5 . . .	5 6.17 41.67 15.63	4 4.94 33.33 16.00	2 2.47 16.67 22.22	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.23 8.33 20.00	12 14.81
21-50	18 . . .	8 9.88 44.44 25.00	5 6.17 27.78 20.00	0 0.00 0.00 0.00	3 3.70 16.67 50.00	0 0.00 0.00 0.00	2 2.47 11.11 40.00	18 22.22
>50	9 . . .	15 18.52 35.71 46.88	14 17.28 33.33 56.00	7 8.64 16.67 77.78	3 3.70 7.14 50.00	3 3.70 7.14 75.00	0 0.00 0.00 0.00	42 51.85
TOTAL	. .	32 39.51	25 30.86	9 11.11	6 7.41	4 4.94	5 6.17	81 100.00

Table 275. Number and percent of institutions having various numbers of fulltime science faculty, by percent of faculty having access to computers for administrative purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Number of Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Faculty Having Access to Computers for Administrative Purposes							
	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	26 . . .	19 . . .	6 . . .	4 . . .	4 . . .	1 . . .	0 . . .	. .
0-10	34 . . .	3 3.75 37.50 9.68	2 2.50 25.00 8.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.25 12.50 25.00	2 2.50 25.00 40.00	8 10.00
11-20	8 . . .	8 10.00 61.54 25.81	3 3.75 23.08 12.00	2 2.50 15.38 22.22	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	13 16.25
21-50	14 . . .	6 7.50 31.58 19.35	6 7.50 31.58 24.00	1 1.25 5.26 11.11	3 3.75 15.79 50.00	0 0.00 0.00 0.00	3 3.75 15.79 60.00	19 23.75
>50	7 . . .	14 17.50 35.00 45.16	14 17.50 35.00 56.00	6 7.50 15.00 66.67	3 3.75 7.50 50.00	3 3.75 7.50 75.00	0 0.00 0.00 0.00	40 50.00
TOTAL	. .	31 38.75	25 31.25	9 11.25	6 7.50	4 5.00	5 6.25	80 100.00

Table 276. Number and percent of institutions having various numbers of science faculty, by percent of faculty having access to computers for administrative purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Percent of Faculty Having Access to Computers for Instructional Purposes

Number of Fulltime Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	23	9	12	4	6	1	3	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-10	32	3	3	0	1	1	1	9
	.	3.57	3.57	0.00	1.19	1.19	1.19	10.71
	.	33.33	33.33	0.00	11.11	11.11	11.11	
	.	12.50	8.82	0.00	14.29	100.00	20.00	
11-20	5	7	5	0	0	0	0	12
	.	8.33	5.95	0.00	0.00	0.00	0.00	14.29
	.	58.33	41.67	0.00	0.00	0.00	0.00	
	.	29.17	14.71	0.00	0.00	0.00	0.00	
21-50	15	4	9	3	4	0	1	21
	.	4.76	10.71	3.57	4.76	0.00	1.19	25.00
	.	19.05	42.86	14.29	19.05	0.00	4.76	
	.	16.67	26.47	23.08	57.14	0.00	20.00	
>50	9	10	17	10	2	0	3	42
	.	11.90	20.24	11.90	2.38	0.00	3.57	50.00
	.	23.81	40.48	23.81	4.76	0.00	7.14	
	.	41.67	50.00	76.92	28.57	0.00	60.00	
TOTAL	.	24	34	13	7	1	5	84
	.	28.57	40.48	15.48	8.33	1.19	5.95	100.00

Table 277. Number and percent of institutions having various numbers of fulltime science faculty, by percent of faculty having access to computers for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Percent of Faculty Having Access to Computers for Instructional Purposes

Number of Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	24 . . .	10 . . .	12 . . .	4 . . .	6 . . .	1 . . .	3 . . .	. .
0-10	34 . . .	2 2.41 25.00 8.70	4 4.82 50.00 11.76	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.20 12.50 100.00	1 1.20 12.50 20.00	8 9.64
11-20	8 . . .	8 9.64 61.54 34.78	4 4.82 30.77 11.76	0 0.00 0.00 0.00	1 1.20 7.69 14.29	0 0.00 0.00 0.00	0 0.00 0.00 0.00	13 15.66
21-50	11 . . .	3 3.61 13.64 13.04	10 12.05 45.45 29.41	4 4.82 18.18 30.77	4 4.82 18.18 57.14	0 0.00 0.00 0.00	1 1.20 4.55 20.00	22 26.51
>50	7 . . .	10 12.05 25.00 43.48	16 19.28 40.00 47.06	9 10.84 22.50 69.23	2 2.41 5.00 28.57	0 0.00 0.00 0.00	3 3.61 7.50 60.00	40 48.19
TOTAL	. .	23 27.71	34 40.96	13 15.66	7 8.43	1 1.20	5 6.02	83 100.00

Table 278. Number and percent of institutions having various numbers of science faculty, by percent of faculty having access to computers for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Number of Fulltime Science Faculty, 1978-79

```
FREQUENCY|
PERCENT  |          Percent of Faculty Having Access to Computers for Research Purposes
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     25 |     12 |     13 |      4 |      3 |      0 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |     32 |      3 |      4 |      0 |      1 |      1 |      0 |      9
         |      . |   3.61 |   4.82 |   0.00 |   1.20 |   1.20 |   0.00 |  10.84
         |      . |  33.33 |  44.44 |   0.00 |  11.11 |  11.11 |   0.00 |
         |      . |  16.67 |  10.53 |   0.00 |  14.29 | 100.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
11-20    |      5 |      5 |      4 |      2 |      1 |      0 |      0 |     12
         |      . |   6.02 |   4.82 |   2.41 |   1.20 |   0.00 |   0.00 |  14.46
         |      . |  41.67 |  33.33 |  16.67 |   8.33 |   0.00 |   0.00 |
         |      . |  27.78 |  10.53 |  11.11 |  14.29 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
21-50    |     18 |      3 |     10 |      4 |      1 |      0 |      0 |     18
         |      . |   3.61 |  12.05 |   4.82 |   1.20 |   0.00 |   0.00 |  21.69
         |      . |  16.67 |  55.56 |  22.22 |   5.56 |   0.00 |   0.00 |
         |      . |  16.67 |  26.32 |  22.22 |  14.29 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>50      |      7 |      7 |     20 |     12 |      4 |      0 |      1 |     44
         |      . |   8.43 |  24.10 |  14.46 |   4.82 |   0.00 |   1.20 |  53.01
         |      . |  15.91 |  45.45 |  27.27 |   9.09 |   0.00 |   2.27 |
         |      . |  38.89 |  52.63 |  66.67 |  57.14 |   0.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       18       38       18        7        1        1       83
                .    21.69    45.78    21.69     8.43     1.20     1.20   100.00
```

Table 279. Number and percent of institutions having various numbers of fulltime science faculty, by percent of faculty having access to computers for research purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Number of Science Faculty, 1978-79

```
FREQUENCY|
PERCENT  |         Percent of Faculty Having Access to Computers for Research Purposes
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40%  |41%-60%  |61%-80%  |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     26 |     13 |     13 |      4 |      3 |      0 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |     34 |      2 |      5 |      0 |      0 |      1 |      0 |      8
         |      . |   2.44 |   6.10 |   0.00 |   0.00 |   1.22 |   0.00 |   9.76
         |      . |  25.00 |  62.50 |   0.00 |   0.00 |  12.50 |   0.00 |
         |      . |  11.76 |  13.16 |   0.00 |   0.00 | 100.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
11-20    |      7 |      5 |      6 |      1 |      2 |      0 |      0 |     14
         |      . |   6.10 |   7.32 |   1.22 |   2.44 |   0.00 |   0.00 |  17.07
         |      . |  35.71 |  42.86 |   7.14 |  14.29 |   0.00 |   0.00 |
         |      . |  29.41 |  15.79 |   5.56 |  28.57 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
21-50    |     15 |      3 |      8 |      6 |      1 |      0 |      0 |     18
         |      . |   3.66 |   9.76 |   7.32 |   1.22 |   0.00 |   0.00 |  21.95
         |      . |  16.67 |  44.44 |  33.33 |   5.56 |   0.00 |   0.00 |
         |      . |  17.65 |  21.05 |  33.33 |  14.29 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>50      |      5 |      7 |     19 |     11 |      4 |      0 |      1 |     42
         |      . |   8.54 |  23.17 |  13.41 |   4.88 |   0.00 |   1.22 |  51.22
         |      . |  16.67 |  45.24 |  26.19 |   9.52 |   0.00 |   2.38 |
         |      . |  41.18 |  50.00 |  61.11 |  57.14 |   0.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       17       38       18        7        1        1       82
                .    20.73    46.34    21.95     8.54     1.22     1.22   100.00
```

Table 280. Number and percent of institutions having various numbers of science faculty, by percent of faculty having access to computers for research purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Percent of Faculty Having Access to Computers for Games-Experiment Purposes

Number of Fulltime Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	34 . . .	13 . . .	3 . . .	2 . . .	6 . . .	0 . . .	0 . . .	. .
0-10	33 . . .	2 2.99 25.00 6.90	2 2.99 25.00 6.90	2 2.99 25.00 40.00	0 0.00 0.00 0.00	1 1.49 12.50 100.00	1 1.49 12.50 100.00	8 11.94
11-20	5 . . .	7 10.45 58.33 24.14	5 7.46 41.67 17.24	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	12 17.91
21-50	22 . . .	4 5.97 28.57 13.79	8 11.94 57.14 27.59	1 1.49 7.14 20.00	1 1.49 7.14 50.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	14 20.90
>50	18 . . .	16 23.88 48.48 55.17	14 20.90 42.42 48.28	2 2.99 6.06 40.00	1 1.49 3.03 50.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	33 49.25
TOTAL	. .	29 43.28	29 43.28	5 7.46	2 2.99	1 1.49	1 1.49	67 100.00

Table 281. Number and percent of institutions having various numbers of fulltime science faculty, by percent of faculty having access to computers for games-experiment purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Percent of Faculty Having Access to Computers for Games-Experiment Purposes

Number of Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	35 . . .	14 . . .	3 . . .	2 . . .	6 . . .	0 . . .	0 . . .	. .
0-10	35 . . .	2 3.03 28.57 7.14	3 4.55 42.86 10.34	1 1.52 14.29 20.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.52 14.29 100.00	7 10.61
11-20	8 . . .	8 12.12 61.54 28.57	3 4.55 23.08 10.34	1 1.52 7.69 20.00	0 0.00 0.00 0.00	1 1.52 7.69 100.00	0 0.00 0.00 0.00	13 19.70
21-50	18 . . .	3 4.55 20.00 10.71	9 13.64 60.00 31.03	2 3.03 13.33 40.00	1 1.52 6.67 50.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	15 22.73
>50	16 . . .	15 22.73 48.39 53.57	14 21.21 45.16 48.28	1 1.52 3.23 20.00	1 1.52 3.23 50.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	31 46.97
TOTAL	. .	28 42.42	29 43.94	5 7.58	2 3.03	1 1.52	1 1.52	66 100.00

Table 282. Number and percent of institutions having various numbers of science faculty, by percent of faculty having access to computers for games-experiment purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

H. Relationships Between the Size of Science Faculties, and Efforts to Improve Academic Computing Capabilities

Relationships between the size of science faculties in minority institutions and two indicators of efforts to improve the status of academic computing in the institutions are examined in this section. Academic vice presidents'/deans' responses to the question "Have campus-wide study groups met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes?" and science department heads' responses to the question "Have study groups from your department met to plan for the acquisition or improvement of computer facilities and capabilities?" will, once again, be used as indicators of institutional efforts to improve their computing status.

From Tables 283 and 284 we see that the proportion of academic vice presidents/deans reporting the existence of campus-wide computing study groups is substantially higher in institutions with more than ten science faculty members (either total or full-time equivalent). In addition, the percentage of vice presidents/deans reporting the existence of campus-wide computing study groups increases monotonically as a function of the number of science faculty employed by the institution. The contingency coefficients associated with these tables are 0.44 and 0.42, respectively.

The percentage of science department heads reporting that departmental study groups on computing have met is somewhat higher in institutions with larger numbers of science faculty members than in institutions with fewer science faculty (See Tables 286 and 287), but the relationships are quite modest. The percentage of affirmative responses increases by about 15 in institutions with at least 21 total science faculty members and in institutions with at least 11 full-time-equivalent science faculty members. The contingency coefficients associated with these tables are 0.21 and 0.26, respectively.

```
                    TABLE OF SFFT78 BY CWSG

SFFT78    NUM FULLTIME FACULTY IN SCIENCE 78-79   CWSG         C

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |    .    |YES     |NO      |  TOTAL
---------+---------+--------+--------+
    .    |       0 |      3 |      2 |     .
         |       . |      . |      . |     .
         |       . |      . |      . |
         |       . |      . |      . |
---------+---------+--------+--------+
0-10     |       0 |     13 |     19 |    32
         |       . |  17.57 |  25.68 | 43.24
         |       . |  40.63 |  59.38 |
         |       . |  26.53 |  76.00 |
---------+---------+--------+--------+
11-20    |       0 |      8 |      3 |    11
         |       . |  10.81 |   4.05 | 14.86
         |       . |  72.73 |  27.27 |
         |       . |  16.33 |  12.00 |
---------+---------+--------+--------+
21-50    |       1 |     15 |      2 |    17
         |       . |  20.27 |   2.70 | 22.97
         |       . |  88.24 |  11.76 |
         |       . |  30.61 |   8.00 |
---------+---------+--------+--------+
>50      |       3 |     13 |      1 |    14
         |       . |  17.57 |   1.35 | 18.92
         |       . |  92.86 |   7.14 |
         |       . |  26.53 |   4.00 |
---------+---------+--------+--------+
TOTAL            .       49       25      74
                 .    66.22    33.78  100.00
```

Campus-Wide Computer Groups Have Met

Number of Fulltime Science Faculty, 1978-79

Table 283. Number and percent of institutions having various numbers of fulltime science faculty, by instituions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF SFTE78 BY CWSG

SFTE78    FACULTY IN SCIENCE 78-79    CWSG          CAMPUSWIDE STUD

FREQUENCY|
PERCENT  |    Campus-Wide Computer Groups Have Met
ROW PCT  |
COL PCT  |   .     |YES     |NO      |  TOTAL
---------+---------+--------+--------+
   .     |       0 |      4 |      2 |     .
         |       . |      . |      . |     .
         |       . |      . |      . |
         |       . |      . |      . |
---------+---------+--------+--------+
0-10     |       0 |     12 |     18 |    30
         |       . |  16.44 |  24.66 | 41.10
         |       . |  40.00 |  60.00 |
         |       . |  25.00 |  72.00 |
---------+---------+--------+--------+
11-20    |       0 |     11 |      3 |    14
         |       . |  15.07 |   4.11 | 19.18
         |       . |  78.57 |  21.43 |
         |       . |  22.92 |  12.00 |
---------+---------+--------+--------+
21-50    |       2 |     13 |      3 |    16
         |       . |  17.81 |   4.11 | 21.92
         |       . |  81.25 |  18.75 |
         |       . |  27.08 |  12.00 |
---------+---------+--------+--------+
>50      |       2 |     12 |      1 |    13
         |       . |  16.44 |   1.37 | 17.81
         |       . |  92.31 |   7.69 |
         |       . |  25.00 |   4.00 |
---------+---------+--------+--------+
TOTAL            .       48       25      73
                 .    65.75    34.25  100.00
```

Number of Science Faculty, 1978-79

Table 284. Number and percent of institutions having various numbers of science faculty by institutions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

TABLE OF SFFT78 BY STUC

SFFT78 NUM FULLTIME FACULTY IN SCIENCE 78-79 STUD DEPT STUDY

Departmental Computer Groups Have Met

Number of Fulltime Science Faculty, 1978-79

FREQUENCY PERCENT ROW PCT COL PCT	.	YES	NO	DO NOT KNOW	PRES FAC EXCEL	TOTAL
.	1 . . .	35 . . .	19 . . .	2 . . .	1 . . .	. .
0-10	15 . . .	13 10.83 50.00 18.06	12 10.00 46.15 30.00	1 0.83 3.85 12.50	0 . . .	26 21.67
11-20	2 . . .	7 5.83 46.67 9.72	7 5.83 46.67 17.50	1 0.83 6.67 12.50	0 . . .	15 12.50
21-50	5 . . .	20 16.67 64.52 27.78	8 6.67 25.81 20.00	3 2.50 9.68 37.50	0 . . .	31 25.83
>50	3 . . .	32 26.67 66.67 44.44	13 10.83 27.08 32.50	3 2.50 6.25 37.50	0 . . .	48 40.00
TOTAL	. .	72 60.00	40 33.33	8 6.67	. .	120 100.00

Table 286. Number and percent of institutions having various numbers of fulltime science faculty by institutions reporting departmental groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 178 heads of science departments in minority higher education institutions.

```
                        TABLE OF SFTE78 BY STUD

SFTE78     FACULTY IN SCIENCE 78-79    STUD      DEPT STUDY GROUP PLAN I

FREQUENCY|
PERCENT  |           Departmental Computer Groups Have Met
ROW PCT  |
COL PCT  |        |YES     |NO      |DO  NOT |PRES FAC|  TOTAL
         |       .|        |        | KNOW   | EXCEL  |
---------+--------+--------+--------+--------+--------+
    .    |      2 |     35 |     20 |      2 |      1 |      .
         |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+
0-10     |     14 |     12 |     15 |      1 |      0 |     28
         |      . |  10.08 |  12.61 |   0.84 |      . |  23.53
         |      . |  42.86 |  53.57 |   3.57 |      . |
         |      . |  16.67 |  38.46 |  12.50 |      . |
---------+--------+--------+--------+--------+--------+
11-20    |      3 |     11 |      6 |      1 |      0 |     18
         |      . |   9.24 |   5.04 |   0.84 |      . |  15.13
         |      . |  61.11 |  33.33 |   5.56 |      . |
         |      . |  15.28 |  15.38 |  12.50 |      . |
---------+--------+--------+--------+--------+--------+
21-50    |      4 |     20 |      6 |      3 |      0 |     29
         |      . |  16.81 |   5.04 |   2.52 |      . |  24.37
         |      . |  68.97 |  20.69 |  10.34 |      . |
         |      . |  27.78 |  15.38 |  37.50 |      . |
---------+--------+--------+--------+--------+--------+
>50      |      3 |     29 |     12 |      3 |      0 |     44
         |      . |  24.37 |  10.08 |   2.52 |      . |  36.97
         |      . |  65.91 |  27.27 |   6.82 |      . |
         |      . |  40.28 |  30.77 |  37.50 |      . |
---------+--------+--------+--------+--------+--------+
TOTAL           .       72       39        8        .      119
                .    60.50    32.77     6.72        .   100.00
```

Number of Science Faculty, 1978-79

Table 287 Number and percent of institutions having various numbers of science faculty by institutions reporting departmental groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 178 heads of science deaprtments deans in minority higher education institutions.

I. Relationships Between Science Degree Offerings and Access to Academic Computing

In this section we examine relationships between the science degrees offered by minority higher education institutions and various indicators of access to academic computing facilities and opportunities. In particular, we examine relationships between academic vice presidents' or deans' responses to questions on whether or not their institutions offer associate, bachelors, masters, and doctoral degrees in the sciences and whether or not their institutions offer an academic minor in the sciences, and the following six indicators of access to computing for academic purposes in these institutions: vice presidents'/deans' reports on whether or not their institutions have access to a computer, science department heads' reports on whether faculty and students in their departments have access to a computer for academic purposes, whether undergraduates in their departments are provided access to a computer, whether graduate students in their departments are provided access to a computer, and whether faculty in their departments are provided access to a computer, and finally, vice presidents'/deans' reports on whether or not a computer is located on their campus.

Relationships between these variables are summarized in Figure 2, and more detailed information on individual relationships is provided in Tables 288 through 317.

From Figure 2 we see that institutional access to a computer is unrelated to whether or not a minority institution offers any degree other than a bachelors degree, and is only slightly positively related to that variable. Science faculty and students have a slightly lower probability of having access to a computer in institutions that offer an associate degree in science, a substantially higher probability of having access to a computer in institutions that offer a science bachelors degree, and a modestly higher probability of access in institutions that offer a masters degree. Their access to a computer is apparently unrelated to whether or not their institution offers a science doctorate or a minor in science. Science undergraduates are no less likely to have access to a computer in institutions that offer an associate degree in science, markedly more likely to have such access in institutions that offer a science bachelors degree, and slightly more likely to have such access in institutions that offer a science masters degree, a science doctoral degree, or a minor in science. Graduate students in the sciences are slightly less likely to have access to a computer in institutions that offer an associate degree in science, substantially more likely to have such access in institutions that offer a bachelors degree or a masters degree in the sciences, and markedly more likely to have such access in institutions that offer either a doctorate in the sciences or a minor in science. Faculty in the sciences are slightly more likely to have access to a computer in institutions that offer a masters degree in the sciences. Otherwise, their access to a computer appears to be unrelated to the degree offerings of their institutions. An institution is somewhat less likely to have a computer located on its campus if it offers an associate degree in the sciences, substantially more likely to have a computer on its campus if it offers a bachelors degree in the sciences, and somewhat more likely to have a computer located on its campus if it offers a masters degree in the sciences. Whether offering a doctorate is related to the likelihood of having a computer on campus cannot be determined from available data due to the small number of institutions providing data on both questions. Whether or not an institution offers a minor in the sciences appears to be unrelated to the probability that it will have a computer located on its campus.

Degree Offered	Indicator of Access to Computing Facilities					
	Institutions Has Access to a Computer	Science Faculty and Students Have Access to a Computer	Science Undergrads Have Access to a Computer	Science Grad Students Have Access to a Computer	Science Faculty Have Access to a Computer	Computer Located on Campus
Science Associate Degree	Table 288. No relationship contingency coeff. = 0.07	Table 289. Slight negative relationship. Contingency coeff. = 0.12	Table 290. No relationship Contingency coeff. = 0.07	Table 291. Slight negative relationship. Contingency Coeff. = 0.18	Table 292. No relationship Contingency coeff. = 0.10	Table 293. Modest negative relationship. Contingency coeff.=0.24
Science Bachelors Degree	Table 294. Slight positive relationship Contingency coeff. = 0.17	Table 295. Substantial positive relationship Contingency coeff. = 0.41	Table 296. Marked positive relationship. Contingency coeff. = 0.31	Table 297. Substantial positive relationship Contingency coeff. = 0.62	Table 298. No relationship Contingency coeff. = 0.08	Table 299. Substantial positive relationship. Contingency coeff.=0.40
Science Masters Degree	Table 300. No relationship Contingency coeff. = 0.07	Table 301. Modest positive relationship. Contingency coeff. = 0.25	Table 302. Slight positive relationship. Contingency coeff. = 0.20	Table 303. Substantial positive relationship Contingency coeff. = 0.59	Table 304. Slight positive relationship Contingency coeff. = 0.18	Table 305. Modest positive relationship. Contingency coeff.=0.23
Science Doctoral Degree	Table 306. Relationship Indeterminate due to small sample size	Table 307. No relationship Contingency coeff. = 0.03	Table 308. Slight positive relationship. Contingency coeff. = 0.13	Table 309. Marked positive relationship Contingency coeff. = 0.31	Table 310. No relationship Contingency coeff. = 0.09	Table 311. Relationship. Indeterminate due to small sample size

Figure 2. Continued

Degree Offered	Indicator of Access to Computing Facilities					
	Institutions Has Access to a Computer	Science Faculty and Students Have Access to a Computer	Science Undergrads Have Access to a Computer	Science Grad Students Have Access to a Computer	Science Faculty Have Access to a Computer	Computer Located on Campus
Minor in Science	Table 312. No relationship Contingency coeff. = 0.02	Table 313. No relationship Contingency coeff. = 0.00	Table 314. Slight positive relationship. Contingency coeff. = 0.12	Table 315. Marked positive relationship Contingency coeff. = 0.36	Table 316. No relationship Contingency coeff. = 0.03	Table 317. No relationship Contingency coeff.= 0.06

Figure 2. Summary of relationships between the degree offerings of minority higher education institutions and indicators of access to academic computing facilities, as reported by 83 academic vice presidents or deans and 178 heads of science departments.

```
                    TABLE OF OFFA BY INACOMP

OFFA       IS SCIENCE ASSOCIATE DEGREE OFFERED   INACOMP   DOES
```

Institution Has Access
to a Computer

Science Associate Degrees Offered

```
FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |   .     |YES      |NO       |  TOTAL
---------+---------+---------+---------+
   .     |       0 |       5 |       1 |     .
         |       . |       . |       . |     .
         |       . |       . |       . |
         |       . |       . |       . |
---------+---------+---------+---------+
YES      |       0 |      36 |       5 |    41
         |       . |   47.37 |    6.58 | 53.95
         |       . |   87.80 |   12.20 |
         |       . |   55.38 |   45.45 |
---------+---------+---------+---------+
NO       |       1 |      29 |       6 |    35
         |       . |   38.16 |    7.89 | 46.05
         |       . |   82.86 |   17.14 |
         |       . |   44.62 |   54.55 |
---------+---------+---------+---------+
TOTAL            .        65        11       76
                 .     85.53     14.47   100.00
```

Table 288. Number and percent of institutions offering an associate degree in science, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                      TABLE OF OFFA BY COMPAC

OFFA      IS SCIENCE ASSOCIATE DEGREE OFFERED     COMPAC      FACUL

FREQUENCY|  Science Faculty or Students
PERCENT  |  Have Access to a Computer
ROW PCT  |
COL PCT  |  .       |YES      |NO       |  TOTAL
---------+--------+---------+---------+
 .       |       1 |      36 |      19 |      .
         |       . |       . |       . |      .
         |       . |       . |       . |
         |       . |       . |       . |
---------+--------+---------+---------+
YES      |      13 |      44 |      17 |     61
         |       . |   35.77 |   13.82 |  49.59
         |       . |   72.13 |   27.87 |
         |       . |   46.32 |   60.71 |
---------+--------+---------+---------+
NO       |      11 |      51 |      11 |     62
         |       . |   41.46 |    8.94 |  50.41
         |       . |   82.26 |   17.74 |
         |       . |   53.68 |   39.29 |
---------+--------+---------+---------+
TOTAL            .       95        28      123
                 .    77.24     22.76   100.00
```

Science Associate Degrees Offered

Table 289. Number and percent of institutions offering an associate degree in science, by institutions providing access to a computer for science faculty or students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF OFFA BY UNDAC

OFFA      IS SCIENCE ASSOCIATE DEGREE OFFERED   UNDAC     COMPUT

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |        .|YES     |NO      |  TOTAL
---------+---------+--------+--------+
    .    |      20 |     34 |      2 |       .
         |       . |      . |      . |       .
         |       . |      . |      . |
         |       . |      . |      . |
---------+---------+--------+--------+
YES      |      31 |     37 |      6 |      43
         |       . |  38.54 |   6.25 |   44.79
         |       . |  86.05 |  13.95 |
         |       . |  43.33 |  54.55 |
---------+---------+--------+--------+
NC       |      20 |     48 |      5 |      53
         |       . |  50.00 |   5.21 |   55.21
         |       . |  90.57 |   9.43 |
         |       . |  56.47 |  45.45 |
---------+---------+--------+--------+
TOTAL            .       85       11       96
                 .    88.54    11.46   100.00
```

Science Undergraduates Have
Access to a Computer

Science Associate Degrees Offered

Table 290. Number and percent of institutions offering an associate degree in science, by institutions providing access to a computer for undergraduate science students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                        TABLE OF OFFA BY GRADAC

OFFA       IS SCIENCE ASSOCIATE DEGREE OFFERED   GRADAC    COMPUTERS

FREQUENCY|
PERCENT  | Science Graduate Students Have Access to a Computer
ROW PCT  |
COL PCT  |         .|YES      |NO       |NOT APPL|  TOTAL
---------+---------+---------+---------+---------+
   .     |       40 |      13 |       3 |       0 |       .
         |        . |       . |       . |       . |       .
         |        . |       . |       . |       . |
         |        . |       . |       . |       . |
---------+---------+---------+---------+---------+
YES      |       50 |      16 |       8 |       0 |      24
         |        . |   30.77 |   15.38 |    0.00 |   46.15
         |        . |   66.67 |   33.33 |    0.00 |
         |        . |   43.24 |   57.14 |    0.00 |
---------+---------+---------+---------+---------+
NO       |       45 |      21 |       6 |       1 |      28
         |        . |   40.38 |   11.54 |    1.92 |   53.85
         |        . |   75.00 |   21.43 |    3.57 |
         |        . |   56.76 |   42.86 |  100.00 |
---------+---------+---------+---------+---------+
TOTAL             .       37        14         1       52
                  .    71.15     26.92      1.92   100.00
```

Science Associate Degrees Offered

Table 291. Number and percent of institutions offering an associate degree in science, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF OFFA BY ACCFAC

OFFA      IS SCIENCE ASSOCIATE DEGREE OFFERED    ACCFAC     COMP

FREQUENCY| Science Faculty Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |   .    |YES     |NO      |  TOTAL
---------+--------+--------+--------+
    .    |     20 |     34 |      2 |     .
         |      . |      . |      . |     .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |     29 |     41 |      4 |    45
         |      . |  42.27 |   4.12 | 46.39
         |      . |  91.11 |   8.89 |
         |      . |  45.05 |  66.67 |
---------+--------+--------+--------+
NO       |     21 |     50 |      2 |    52
         |      . |  51.55 |   2.06 | 53.61
         |      . |  96.15 |   3.85 |
         |      . |  54.95 |  33.33 |
---------+--------+--------+--------+
TOTAL           .       91        6       97
                .    93.81     6.19   100.00
```

Science Associate Degrees Offered

Table 292. Number and percent of institutions offering an associate degree in science, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                      TABLE OF OFFA BY CAMPCOMP

OFFA      IS SCIENCE ASSOCIATE DEGREE OFFERED   CAMPCOMP  IS COM

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |
         |       .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |      1 |      4 |      1 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |      5 |     25 |     11 |     36
         |      . |  38.46 |  16.92 |  55.38
         |      . |  69.44 |  30.56 |
         |      . |  49.02 |  78.57 |
---------+--------+--------+--------+
NO       |      7 |     26 |      3 |     29
         |      . |  40.00 |   4.62 |  44.62
         |      . |  89.66 |  10.34 |
         |      . |  50.98 |  21.43 |
---------+--------+--------+--------+
TOTAL           .       51       14       65
                .    78.46    21.54   100.00
```

Computer is Located on Campus

Science Associate Degrees Offered

Table 293. Number and percent of institutions offering an associate degree in science, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                     TABLE OF OFFB BY INACOMP

OFFB      IS SCIENCE BACHELORS OFFERED     INACOMP    DOES INSTITUT

FREQUENCY|  Institution Has Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |   .     |YES      |NO       |  TOTAL
---------+---------+---------+---------+
   .     |       0 |       4 |       2 |      .
         |       . |       . |       . |      .
         |       . |       . |       . |
         |       . |       . |       . |
---------+---------+---------+---------+
YES      |       1 |      37 |       3 |     40
         |       . |   48,68 |    3,95 |  52,63
         |       . |   92,50 |    7,50 |
         |       . |   56,06 |   30,00 |
---------+---------+---------+---------+
NO       |       0 |      29 |       7 |     36
         |       . |   38,16 |    9,21 |  47,37
         |       . |   80,56 |   19,44 |
         |       . |   43,94 |   70,00 |
---------+---------+---------+---------+
TOTAL              .      66        10       76
                   .   86,84     13,16   100,00
```

Science Bachelors Degrees Offered

Table 294. Number and percent of institutions offering a bachelors degree in science, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF OFFB BY COMPAC

OFFB      IS SCIENCE BACHELORS OFFERED    COMPAC      FACULTY-STU

FREQUENCY|    Science Faculty or Students Have
PERCENT  |         Access to a Computer
ROW PCT  |
COL PCT  |  .      |YES     |NO      |  TOTAL
---------+---------+--------+--------+
   .     |       2 |     40 |     18 |      .
         |       . |      . |      . |      .
         |       . |      . |      . |
         |       . |      . |      . |
---------+---------+--------+--------+
YES      |      13 |     68 |      7 |     75
         |       . |  56.67 |   5.83 |  62.50
         |       . |  90.67 |   9.33 |
         |       . |  74.73 |  24.14 |
---------+---------+--------+--------+
NO       |      10 |     23 |     22 |     45
         |       . |  19.17 |  18.33 |  37.50
         |       . |  51.11 |  48.89 |
         |       . |  25.27 |  75.86 |
---------+---------+--------+--------+
TOTAL            .       91       29      120
                 .    75.83    24.17   100.00
```

Science Bachelors Degrees Offered

Table 295. Number and percent of institutions offering a bachelors degree in science, by institutions providing access to a computer for science faculty or students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF OFFB BY UNDAC

OFFB        IS SCIENCE BACHELORS OFFERED    UNDAC      COMPUTERS A

FREQUENCY|     Science Undergraduates Have
PERCENT  |        Access to a Computer
ROW PCT  |
COL PCT  |       .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
.        |     20 |     38 |      2 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |     19 |     65 |      4 |     69
         |      . |  70.65 |   4.35 |  75.00
         |      . |  94.20 |   5.80 |
         |      . |  80.25 |  36.36 |
---------+--------+--------+--------+
NO       |     32 |     16 |      7 |     23
         |      . |  17.39 |   7.61 |  25.00
         |      . |  69.57 |  30.43 |
         |      . |  19.75 |  63.64 |
---------+--------+--------+--------+
TOTAL           .       81       11       92
                .    88.04    11.96   100.00
```

Science Bachelors Degrees Offered

Table 296. Number and percent of institutions offering a bachelors degree in science, by institutions providing access to a computer for undergraduate science students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF OFFB BY GRADAC

OFFB     IS SCIENCE BACHELORS OFFERED   GRADAC    COMPUTERS AVAILAB

FREQUENCY|
PERCENT  | Science Graduate Students Have Access to a Computer
ROW PCT  |
COL PCT  |        .|YES     |NO      |NCT APPL|  TOTAL
---------+--------+--------+--------+--------+
   .     |      44 |      12 |       4 |       0 |      .
         |       . |       . |       . |       . |      .
         |       . |       . |       . |       . |
         |       . |       . |       . |       . |
---------+--------+--------+--------+--------+
YES      |      45 |      38 |       4 |       1 |     43
         |       . |   73.08 |    7.69 |    1.92 |  82.69
         |       . |   88.37 |    9.30 |    2.33 |
         |       . |  100.00 |   30.77 |  100.00 |
---------+--------+--------+--------+--------+
NO       |      46 |       0 |       9 |       0 |      9
         |       . |    0.00 |   17.31 |    0.00 |  17.31
         |       . |    0.00 |  100.00 |    0.00 |
         |       . |    0.00 |   69.23 |    0.00 |
---------+--------+--------+--------+--------+
TOTAL            .       38       13        1       52
                 .    73.08    25.00     1.92   100.00
```

Science Bachelors Degrees Offered

Table 297. Number and percent of institutions offering a bachelors degree in science, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF OFFB BY ACCFAC

OFFB      IS SCIENCE BACHELORS OFFERED     ACCFAC     COMP FACILITI

FREQUENCY|
PERCENT  |Science Faculty Have Access to a Computer
ROW PCT  |
COL PCT  |       .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
.        |      20|      37|       3|      .
         |       .|       .|       .|      .
         |       .|       .|       .|
         |       .|       .|       .|
---------+--------+--------+--------+
YES      |      18|      67|       3|     70
         |       .|   72.04|    3.23|  75.27
         |       .|   95.71|    4.29|
         |       .|   76.14|   60.00|
---------+--------+--------+--------+
NO       |      32|      21|       2|     23
         |       .|   22.58|    2.15|  24.73
         |       .|   91.30|    8.70|
         |       .|   23.86|   40.00|
---------+--------+--------+--------+
TOTAL           .       88        5      93
                .    94.62     5.38  100.00

Science Bachelors Degrees Offered
```

Table 298. Number and percent of institutions offering a bachelors degree in science, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                 STATISTICAL ANALYSIS SYSTEM                          21:36 WE

                              TABLE OF OFFB BY CAMPCOMP

                OFFB       IS SCIENCE BACHELORS OFFERED   CAMPCOMP  IS COMPUTER

                FREQUENCY|
                PERCENT  |      Computer is Located on Campus
                ROW PCT  |
                COL PCT  |        |YES     |NO      |
                         |       .|        |        |  TOTAL
                ---------+--------+--------+--------+
                 .       |       2|       3|       1|      .
                         |       .|       .|       .|      .
                         |       .|       .|       .|
                         |       .|       .|       .|
                ---------+--------+--------+--------+
                YES      |       4|      35|       2|     37
                         |       .|   53.03|    3.03|  56.06
                         |       .|   94.59|    5.41|
                         |       .|   67.31|   14.29|
                ---------+--------+--------+--------+
                NO       |       7|      17|      12|     29
                         |       .|   25.76|   18.18|  43.94
                         |       .|   58.62|   41.38|
                         |       .|   32.69|   85.71|
                ---------+--------+--------+--------+
                TOTAL            .       52       14      66
                                 .    78.79    21.21  100.00
```

Science Bachelors Degrees Offered

Table 299 . Number and percent of institutions offering a bachelors degree in science, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
        S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                              21:36 WE
                                                -404-
                    TABLE OF OFFM BY INACOMP

OFFM        IS SCIENCE MASTERS OFFERED     INACOMP     DOES INSTITUT

FREQUENCY|
PERCENT  |Institution Has Access to a Computer
ROW PCT  |
COL PCT  |   .     |YES     |NO      |  TOTAL
---------+---------+--------+--------+
   .     |       0 |      6 |      2 |     .
         |       . |      . |      . |     .
         |       . |      . |      . |
         |       . |      . |      . |
---------+---------+--------+--------+
YES      |       1 |     11 |      1 |    12
         |       . |  14.86 |   1.35 | 16.22
         |       . |  91.67 |   8.33 |
         |       . |  17.19 |  10.00 |
---------+---------+--------+--------+
NC       |       0 |     53 |      9 |    62
         |       . |  71.62 |  12.16 | 83.78
         |       . |  85.48 |  14.52 |
         |       . |  82.81 |  90.00 |
---------+---------+--------+--------+
TOTAL            .       64       10      74
                 .    86.49    13.51  100.00
```

Science Masters Degrees Offered

Table 300. Number and percent of institutions offering a masters degree in science, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF OFFM BY COMPAC

OFFM       IS SCIENCE MASTERS OFFERED    COMPAC     FACULTY-STUDEN

FREQUENCY|      Science Faculty or Students Have
PERCENT  |           Access to a Computer
ROW PCT  |
COL PCT  |   .     |YES      |NO       |  TOTAL
---------+---------+---------+---------+
   .     |      3  |     40  |     19  |      .
         |      .  |      .  |      .  |      .
         |      .  |      .  |      .  |
         |      .  |      .  |      .  |
---------+---------+---------+---------+
YES      |      1  |     35  |      3  |     38
         |      .  |  29.41  |   2.52  |  31.93
         |      .  |  92.11  |   7.89  |
         |      .  |  38.46  |  10.71  |
---------+---------+---------+---------+
NO       |     21  |     56  |     25  |     81
         |      .  |  47.06  |  21.01  |  68.07
         |      .  |  69.14  |  30.86  |
         |      .  |  61.54  |  89.29  |
---------+---------+---------+---------+
TOTAL           .        91        28      119
                .     76.47     23.53   100.00

(row axis label: Science Masters Degrees Offered)
```

Table 301. Number and percent of institutions offering a masters degree in science, by institutions providing access to a computer for science faculty or students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF OFFM BY UNDAC

OFFM      IS SCIENCE MASTERS OFFERED   UNDAC      COMPUTERS AVAI

FREQUENCY|       Science Undergraduates Have
PERCENT  |         Access to a Computer
ROW PCT  |
COL PCT  |        .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
    .    |     22 |     38 |      2 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |      6 |     32 |      1 |     33
         |      . |  34.78 |   1.09 |  35.87
         |      . |  96.97 |   3.03 |
         |      . |  39.51 |   9.09 |
---------+--------+--------+--------+
NO       |     43 |     49 |     10 |     59
         |      . |  53.26 |  10.87 |  64.13
         |      . |  83.05 |  16.95 |
         |      . |  60.49 |  90.91 |
---------+--------+--------+--------+
TOTAL           .       81       11       92
                .    88.04    11.96   100.00
```

Science Masters Degrees Offered

Table 302. Number and percent of institutions offering a masters degree in science, by institutions providing access to a computer for undergraduate science students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
         S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                              21:39 WEC

                        TABLE OF OFFM BY GRADAC

OFFM      IS SCIENCE MASTERS OFFERED   GRADAC    COMPUTERS AVAILABLE

FREQUENCY|
PERCENT  |  Science Graduate Students Have Access to a Computer
ROW PCT  |
COL PCT  |       .|YES     |NO      |NOT APPL|  TOTAL
---------+--------+--------+--------+--------+
    .    |      46 |     12 |      4 |      0 |     .
         |       . |      . |      . |      . |     .
         |       . |      . |      . |      . |
         |       . |      . |      . |      . |
---------+--------+--------+--------+--------+
YES      |       8 |     31 |      0 |      0 |    31
         |       . |  59.62 |   0.00 |   0.00 | 59.62
         |       . | 100.00 |   0.00 |   0.00 |
         |       . |  81.58 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+
NO       |      81 |      7 |     13 |      1 |    21
         |       . |  13.46 |  25.00 |   1.92 | 40.38
         |       . |  33.33 |  61.90 |   4.76 |
         |       . |  18.42 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+
TOTAL            .       38       13        1      52
                 .    73.08    25.00     1.92  100.00
```

Science Masters Degrees Offered

Table 303. Number and percent of institutions offering a masters degree in science, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                     TABLE OF OFFM BY ACCFAC

OFFM       IS SCIENCE MASTERS OFFERED    ACCFAC    COMP FACILITI

FREQUENCY|
PERCENT  | Science Faculty Have Access to a Computer
ROW PCT  |
COL PCT  |   .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
   .     |     22 |     37 |      3 |     .
         |      . |      . |      . |     .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |      4 |     35 |      0 |    35
         |      . |  37.63 |   0.00 |  37.63
         |      . | 100.00 |   0.00 |
         |      . |  39.77 |   0.00 |
---------+--------+--------+--------+
NO       |     44 |     53 |      5 |    58
         |      . |  56.99 |   5.38 |  62.37
         |      . |  91.38 |   8.62 |
         |      . |  60.23 | 100.00 |
---------+--------+--------+--------+
TOTAL           .       88        5       93
                .    94.62     5.38   100.00
```

Science Masters Degrees Offered

Table 304. Number and percent of institutions offering a masters degree in science, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF OFFM BY CAMPCOMP

OFFM      IS SCIENCE MASTERS OFFERED   CAMPCOMP  IS COMPUTER ON

FREQUENCY|
PERCENT  |      Computer is Located on Campus
ROW PCT  |
COL PCT  |        |YES     |NO      |   TOTAL
         |        |        |        |
---------+--------+--------+--------+
    .    |      2 |      5 |      1 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |      2 |     11 |      0 |     11
         |      . |  17.19 |   0.00 |  17.19
         |      . | 100.00 |   0.00 |
         |      . |  22.00 |   0.00 |
---------+--------+--------+--------+
NO       |      9 |     39 |     14 |     53
         |      . |  60.94 |  21.88 |  82.81
         |      . |  73.58 |  26.42 |
         |      . |  78.00 | 100.00 |
---------+--------+--------+--------+
TOTAL           .       50       14       64
                .    78.13    21.88   100.00

Science Masters Degrees Offered
```

Table 305. Number and percent of institutions offering a masters degree in science, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                   TABLE OF OFFD BY INACOMP

OFFD      IS SCIENCE DOCTORATE OFFERED   INACOMP   DOES INSTIT

FREQUENCY|  Institution Has Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |  .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
   .     |      0 |      7 |      2 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |      1 |      3 |      1 |      4
         |      . |   4.11 |   1.37 |   5.48
         |      . |  75.00 |  25.00 |
         |      . |   4.76 |  10.00 |
---------+--------+--------+--------+
NO       |      0 |     60 |      9 |     69
         |      . |  82.19 |  12.33 |  94.52
         |      . |  86.96 |  13.04 |
         |      . |  95.24 |  90.00 |
---------+--------+--------+--------+
TOTAL           .       63       10       73
                .    86.30    13.70   100.00
```

Science Doctorate Degrees Offered

Table 306. Number and percent of institutions offering a doctorate degree in science, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M                21:39

                      TABLE OF OFFD BY COMPAC

         OFFD       IS SCIENCE DOCTORATE OFFERED   COMPAC     FACULTY-S

         FREQUENCY|      Science Faculty of Students Have
          PERCENT |           Access to a Computer
          ROW PCT |
          COL PCT |   .      |YES      |NO       |  TOTAL
         ---------+---------+---------+---------+
            .     |       3 |      44 |      19 |     .
                  |       . |       . |       . |     .
                  |       . |       . |       . |
                  |       . |       . |       . |
         ---------+---------+---------+---------+
         YES      |       1 |      11 |       3 |    14
                  |       . |    9.57 |    2.61 | 12.17
                  |       . |   78.57 |   21.43 |
                  |       . |   12.64 |   10.71 |
         ---------+---------+---------+---------+
         NO       |      21 |      76 |      25 |   101
                  |       . |   66.09 |   21.74 | 87.83
                  |       . |   75.25 |   24.75 |
                  |       . |   87.36 |   89.29 |
         ---------+---------+---------+---------+
         TOTAL            .        87        28      115
                          .     75.65     24.35   100.00
```

Science Doctorate Degrees Offered

Table 307. Number and percent of institutions offering a doctorate degree in science, by institutions providing access to a computer for science faculty or students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF OFFD BY UNDAC

OFFD      IS SCIENCE DOCTORATE OFFERED    UNDAC      COMPUTERS

FREQUENCY|      Science Undergraduates Have
PERCENT  |        Access to a Computer
ROW PCT  |
COL PCT  |         .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
    .    |      22 |      42 |       2 |      .
         |       . |       . |       . |      .
         |       . |       . |       . |
         |       . |       . |       . |
---------+--------+--------+--------+
YES      |       6 |       9 |       0 |      9
         |       . |   10,23 |    0,00 |  10,23
         |       . |  100,00 |    0,00 |
         |       . |   11,69 |    0,00 |
---------+--------+--------+--------+
NO       |      43 |      68 |      11 |     79
         |       . |   77,27 |   12,50 |  89,77
         |       . |   86,08 |   13,92 |
         |       . |   88,31 |  100,00 |
---------+--------+--------+--------+
TOTAL            .        77        11       88
                 .     87,50     12,50   100,00
```

Science Doctorate Degrees Offered

Table 308. Number and percent of institutions offering a doctorate degree in science, by institutions providing access to a computer for undergraduate science students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF OFFD BY GRADAC

OFFD      IS SCIENCE DOCTORATE OFFERED   GRADAC    COMPUTERS AVAIL

FREQUENCY|
PERCENT  | Science Graduate Students Have Access to a Computer
ROW PCT  |
COL PCT  |         .|YES     |NO      |NOT APPL|  TOTAL
---------+--------+--------+--------+--------+
    .    |     46 |     16 |      4 |      0 |      .
         |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |
         |      . |      . |      . |      . |
---------+--------+--------+--------+--------+
YES      |      5 |     10 |      0 |      0 |     10
         |      . |  20.83 |   0.00 |   0.00 |  20.83
         |      . | 100.00 |   0.00 |   0.00 |
         |      . |  29.41 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+
NO       |     84 |     24 |     13 |      1 |     38
         |      . |  50.00 |  27.08 |   2.08 |  79.17
         |      . |  63.16 |  34.21 |   2.63 |
         |      . |  70.59 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+
TOTAL           .       34       13        1       48
                .    70.83    27.08     2.08   100.00
```

Science Doctorate Degrees Offered

Table 309. Number and percent of institutions offering a doctorate degree in science, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF OFFD BY ACCFAC

OFFD        IS SCIENCE DOCTORATE OFFERED     ACCFAC     COMP FACILI

FREQUENCY|
PERCENT  |  Science Faculty Have Access to a Computer
ROW PCT  |
COL PCT  |   .    |YES     |NO      |  TOTAL
---------+--------+--------+--------+
    .    |    22  |     41 |      3 |     .
         |     .  |      . |      . |     .
         |     .  |      . |      . |
         |     .  |      . |      . |
---------+--------+--------+--------+
YES      |     4  |     11 |      0 |    11
         |     .  |  12.36 |   0.00 | 12.36
         |     .  | 100.00 |   0.00 |
         |     .  |  13.10 |   0.00 |
---------+--------+--------+--------+
NO       |    44  |     73 |      5 |    78
         |     .  |  82.02 |   5.62 | 87.64
         |     .  |  93.59 |   6.41 |
         |     .  |  86.90 | 100.00 |
---------+--------+--------+--------+
TOTAL          .        84        5      89
               .     94.38     5.62  100.00
```

Science Doctorate Degrees Offered

Table 310. Number and percent of institutions offering a doctorate degree in science, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
             S T A T I S T I C A L   A N A L Y S I S   S Y S T E M                21:36
                                                              -415-
                        TABLE OF OFFD BY CAMPCOMP

      OFFD       IS SCIENCE DOCTORATE OFFERED    CAMPCOMP  IS COMPUT

      FREQUENCY|
       PERCENT |        Computer is Located on Campus
       ROW PCT |
       COL PCT |        |YES     |NO      |
               |   .    |        |        |  TOTAL
      ---------+--------+--------+--------+
       .       |      2 |      6 |      1 |      .
               |      . |      . |      . |      .
               |      . |      . |      . |
               |      . |      . |      . |
      ---------+--------+--------+--------+
      YES      |      2 |      3 |      0 |      3
               |      . |   4.76 |   0.00 |   4.76
               |      . | 100.00 |   0.00 |
               |      . |   6.12 |   0.00 |
      ---------+--------+--------+--------+
      NO       |      9 |     46 |     14 |     60
               |      . |  73.02 |  22.22 |  95.24
               |      . |  76.67 |  23.33 |
               |      . |  93.88 | 100.00 |
      ---------+--------+--------+--------+
      TOTAL           .       49       14       63
                      .    77.78    22.22   100.00
```

Science Doctorate Degrees Offered

Table 311. Number and percent of institutions offering a doctorate degree in science, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Minors in Science Offered

```
                    TABLE OF MINOR BY INACOMP

MINOR     IS SCIENCE MINOR OFFEREC     INACOMP     DOES INSTITUT

FREQUENCY|
PERCENT  |  Institution Has Access to a Computer
ROW PCT  |
COL PCT  |  .      |YES     |NO      |  TOTAL
---------+---------+--------+--------+
   .     |        0|       6|       1|     .
         |        .|       .|       .|     .
         |        .|       .|       .|
         |        .|       .|       .|
---------+---------+--------+--------+
YES      |        1|      33|       6|    39
         |        .|   44,00|    8,00| 52,00
         |        .|   84,62|   15,38|
         |        .|   51,56|   54,55|
---------+---------+--------+--------+
NO       |        0|      31|       5|    36
         |        .|   41,33|    6,67| 48,00
         |        .|   86,11|   13,89|
         |        .|   48,44|   45,45|
---------+---------+--------+--------+
TOTAL             .       64       11      75
                  .    85,33    14,67  100,00
```

Table 312 . Number and percent of institutions offering a minor in science, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF MINOR BY COMPAC

MINOR       IS SCIENCE MINOR OFFERED    COMPAC     FACULTY-STUDE

FREQUENCY|      Science Faculty or Students Have
PERCENT  |            Access to a Computer
ROW PCT  |
COL PCT  |       .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
    .    |       1|      40|      19|      .
         |       .|       .|       .|      .
         |       .|       .|       .|
         |       .|       .|       .|
---------+--------+--------+--------+
YES      |      11|      55|      17|     72
         |       .|   46.22|   14.29|  60.50
         |       .|   76.39|   23.61|
         |       .|   60.44|   60.71|
---------+--------+--------+--------+
NO       |      13|      36|      11|     47
         |       .|   30.25|    9.24|  39.50
         |       .|   76.60|   23.40|
         |       .|   39.56|   39.29|
---------+--------+--------+--------+
TOTAL            .       91       28    119
                 .    76.47    23.53 100.00
```

Minors in Science Offered

Table 313. Number and percent of institutions offering a minor in science, providing access to a computer for science faculty or students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                 TABLE OF MINOR BY UNDAC

MINOR     IS SCIENCE MINOR OFFERED   UNDAC     COMPUTERS AV

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |        .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
    .    |      20 |      38 |       2 |      .
         |       . |       . |       . |      .
         |       . |       . |       . |
         |       . |       . |       . |
---------+--------+--------+--------+
YES      |      27 |      51 |       5 |     56
         |       . |   55.43 |    5.43 |  60.87
         |       . |   91.07 |    8.93 |
         |       . |   62.96 |   45.45 |
---------+--------+--------+--------+
NO       |      24 |      30 |       6 |     36
         |       . |   32.61 |    6.52 |  39.13
         |       . |   83.33 |   16.67 |
         |       . |   37.04 |   54.55 |
---------+--------+--------+--------+
TOTAL           .        81        11       92
                .     88.04     11.96   100.00
```

Science Undergraduates Have
Access to a Computer

Minors in Science Offered

Table 314. Number and percent of institutions offering a minor in science, by institutions providing access to a computer for undergraduate science students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Minors in Science Offered

```
                              TABLE OF MINOR BY GRADAC

       MINOR     IS SCIENCE MINOR OFFERED   GRADAC    COMPUTERS AVAILABL

       FREQUENCY|
        PERCENT |Science Graduate Students Have Access to a Computer
        ROW PCT |
        COL PCT |          .|YES      |NO       |NOT APPL|  TOTAL
       ---------+---------+---------+---------+---------+
           .    |      40 |      16 |       4 |       0 |       .
                |       . |       . |       . |       . |       .
                |       . |       . |       . |       . |
                |       . |       . |       . |       . |
       ---------+---------+---------+---------+---------+
       YES      |      54 |      24 |       4 |       1 |      29
                |       . |   50.00 |    8.33 |    2.08 |   60.42
                |       . |   82,76 |   13.79 |    3,45 |
                |       . |   70,59 |   30.77 |  100,00 |
       ---------+---------+---------+---------+---------+
       NO       |      41 |      10 |       9 |       0 |      19
                |       . |   20,83 |   18.75 |    0.00 |   39.58
                |       . |   52.63 |   47.37 |    0.00 |
                |       . |   29,41 |   69.23 |    0.00 |
       ---------+---------+---------+---------+---------+
       TOTAL           .        34        13         1        48
                       .     70,83     27.08      2,08    100.00
```

Table 315 . Number and percent of institutions offering a minor in science, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF MINOR BY ACCFAC

MINOR     IS SCIENCE MINOR OFFEREC   ACCFAC     COMP FACILITI

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |   .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
   .     |     20 |     38 |      2 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |     26 |     53 |      4 |     57
         |      . |  56.99 |   4.30 |  61.29
         |      . |  92.98 |   7.02 |
         |      . |  60.92 |  66.67 |
---------+--------+--------+--------+
NO       |     24 |     34 |      2 |     36
         |      . |  36.56 |   2.15 |  38.71
         |      . |  94.44 |   5.56 |
         |      . |  39.08 |  33.33 |
---------+--------+--------+--------+
TOTAL           .       87        6       93
                .    93.55     6.45   100.00
```

Science Faculty Have Access to a Computer

Minors in Science Offered

Table 316. Number and percent of institutions offering a minor in science, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                TABLE OF MINOR BY CAMPCOMP

MINOR      IS SCIENCE MINOR OFFEREC   CAMPCOMP  IS COMPUTER O

FREQUENCY|
PERCENT  |     Computer is Located on Campus
ROW PCT  |
COL PCT  |        |YES     |NO      |
         |       .|        |        |  TOTAL
---------+--------+--------+--------+
    .    |      1 |      4 |      2 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |      7 |     27 |      6 |     33
         |      . |  42.19 |   9.38 |  51.56
         |      . |  81.82 |  18.18 |
         |      . |  52.94 |  46.15 |
---------+--------+--------+--------+
NO       |      5 |     24 |      7 |     31
         |      . |  37.50 |  10.94 |  48.44
         |      . |  77.42 |  22.58 |
         |      . |  47.06 |  53.85 |
---------+--------+--------+--------+
TOTAL           .       51       13       64
                .    79.69    20.31   100.00
```

Minors in Science Offered

Table 317. Number and percent of institutions offering a minor in science, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

J. Relationships between Science Degree Offerings and the Computing Skills of Faculty and Students in the Sciences

This section contains an examination of relationships between the level of science degrees offered by minority higher education institutions and the reports of science department heads in those institutions on the computing capabilities and skills of students who were newly enrolled in their departments in the fall of 1978, those of science students currently enrolled during the 1978-79 academic year, and those of faculty employed in their departments. These relationships are summarized in Figures 3 through 5, and are illustrated in greater detail in Tables 318 through 377.

Relationships between the level of science degrees offered by minority institutions and the reported computing capabilities and skills of students newly enrolled in science departments in the fall of 1978 are summarized in Figure 3. From that summary, it appears that the computing skills of newly entering science students are somewhat inferior in institutions that award associate degrees in the sciences, are slightly superior in institutions that award bachelors degrees in the sciences, are modestly superior in institutions that award masters degrees in the sciences, are not related in a determinate manner to whether or not an institution awards a doctoral degree in the sciences because relatively few such institutions provided data, and are inconsistently related to the offering of a minor in science by minority institutions.

The computing skills of students who were currently enrolled in science departments during the 1978-79 academic year are related to the academic degree offerings of minority higher education institutions in the manner summarized in Figure 4. From that figure, it appears that the computing skills of currently enrolled students in the sciences are slightly inferior in institutions that award associate degrees in the sciences, are slightly to modestly superior

Degree Offered	Percent of Newly Entering Science Students with Computing Skills at Various Levels			
	No Computer Training or Skills	General Awareness of Computers	Limited Personal Computer Use/Skill	Ability to Program a Computer
Science Associate Degree	Table 318. Modest positive relationship Contingency coeff. = 0.29	Table 319. Marked negative relationship. Contingency coeff. = 0.38	Table 320. No relationship Contingency coeff. = 0.11	Table 321. Modest negative relationship. Contingency coeff. = 0.25
Science Bachelors Degree	Table 330. Modest negative relationship. Contingency coeff. = 0.29	Table 331. Slight positive relationship. Contingency coeff. = 0.16	Table 332. Slight positive relationship. Contingency coeff. = 0.20	Table 333. No relationship Contingency coeff. = 0.17
Science Masters Degree	Table 342. Slight negative relationship. Contingency coeff. = 0.20	Table 343. No relationship Contingency coeff. = 0.16	Table 344. Modest positive relationship. Contingency coeff. - 0.21	Table 345. Modest positive relationship. Contingency coeff. = 0.23
Science Doctroal Degree	Table 354. Relationship indeterminate due to small sample size	Table 355. Relationship indeterminate due to small sample size	Table 356. No apparent relationship but sample size is small	Table 357. Relationship indeterminate due to small sample size
Minor in Science	Table 366. No relationship Contingency coeff. = 0.07	Table 367. Slight negative relationship. Contingency coeff. = 0.21	Table 368. No consistent relationship. Contingency coeff. = 0.13	Table 369. Slight negative relationship. Contingency coeff. = 0.19

Figure 3. Summary of relationships between the degree offerings of minority higher education institutions and percent of newly entering students in the sciences with computing skills at various levels, as reported by 83 academic vice presidents or deans and 178 heads of science departments.

Degree Offered	Percent of Currently Enrolled Science Students with Computing Skills at Various Levels			
	No Computer Training or Skills	General Awareness of Computers	Limited Personal Computer Use/Skill	Ability to Program a Computer
Science Associate Degree	Table 322. Marked positive relationship. Contingency coeff. = 0.33	Table 323. Slight negative relationship. Contingency coeff. = 0.35	Table 324. Slight negative relationship. Contingency coeff. = 0.18	Table 325. Very slight negative relationship Contingency coeff. = 0.23
Science Bachelors Degree	Table 334. Marked negative relationship. Contingency coeff. = 0.33	Table 335. Slight positive relationship. Contingency coeff. = 0.21	Table 336. No consistent relationship Contingency coeff. = 0.31	Table 337. Modest positive relationship. Contingency coeff. = 0.32
Science Masters Degree	Table 346. Modest negative relationship. Contingency coeff. = 0.33	Table 347. Slight positive relationship. Contingency coeff. = 0.37	Table 348. Slight positive relationship Contingency coeff. = 0.25	Table 349. Modest positive relationship. Contingency coeff. = 0.34
Science Doctoral Degree	Table 358. No apparent relationship but sample size is small	Table 359. Possible positive relationship but sample size is small	Table 360. No apparent relationship but sample size is small	Table 361. Possible positive relationship but sample size is small
Minor in Science	Table 370. No consistent relationship. Contingency coeff. = 0.18	Table 371. No consistent relationship Contingency coeff. = 0.26	Table 372. Slight positive relationship. Contingency coeff. = 0.30	Table 373. No relationship Contingency coeff. = 0.14

Figure 4. Summary of relationships between the degree offerings of minority higher education institutions and percent of currently enrolled students in the sciences with computing skills at various levels, as reported by 83 academic vice presidents or deans and 178 heads of science departments.

Degree Offered	Percent of Faculty in Science Departments with Computing Skills at Various Levels			
	No Computer Training or Skills	General Awareness of Computers	Limited Personal Computer Use/Skill	Ability to Program a Computer
Science Associate Degree	Table 326. No relationship Contingency coeff. = 0.09	Table 327. Slight negative relationship Contingency coeff. = 0.34	Table 328. Slight positive relationship. Contingency coeff. = 0.26	Table 329. No relationship Contingency coeff. = 0.17
Science Bachelors Degree	Table 338. Slight positive relationship. Contingency coeff. = 0.21	Table 339. Modest positive relationship. Contingency coeff. = 0.33	Table 340. No consistent relationship Contingency coeff. = 0.41	Table 341. No consistent relationship Contingency coeff. = 0.26
Science Masters Degree	Table 350. No relationship Contingency coeff. = 0.18	Table 351. Modest positive relationship. Contingency coeff. = 0.28	Table 352. Modest positive relationship. Contingency coeff. = 0.26	Table 353. No consistent relationship Contingency coeff. = 0.33
Science Doctoral Degree	Table 362. No apparent relationship but sample size is small	Table 363. Possible positive relationship but sample size is small	Table 364. No apparent relationship but sample size is small	Table 365. Relationship indeterminate due to small sample size
Minor in Science	Table 374. Slight positive relationship. Contingency coeff. = 0.18	Table 375. Slight positive relationship. Contingency coeff. = 0.28	Table 376. Modest positive relationship. Contingency coeff. = 0.35	Table 377. No consistent relationship Contingency coeff. = 0.31

Figure 5. Summary of relationships between the degree offerings of minority higher education institutions and percent of faculty in science departments with computing skills at various levels, as reported by 83 academic vice presidents or deans and 178 heads of science departments.

in institutions that award bachelors degrees in the sciences, are slightly to modestly superior in institutions that award masters degrees in the sciences, are possibly slightly superior in institutions that award doctoral degrees in the sciences (this conclusion must be regarded as tentative since very few responding institutions award doctoral degrees in the sciences), and are not consistently inferior or superior in institutions that offer an academic minor in the sciences.

Figure 5 contains a summary of relationships between the level of degrees offered by minority higher education institutions and the reported computing skills and capabilities of faculty employed in science departments in those institutions. These relationships can be described as follows: The computing skills and capabilities of faculty employed in science departments in minority institutions are inconsistently related (and probably unrelated) to whether or not their institution awards associate degrees in the sciences, are not consistently related to whether or not their institutions award bachelors degrees in the sciences, are slightly superior in institutions which award masters degrees in the sciences, are apparently unrelated to whether or not their institutions award doctoral degrees in the sciences (the existence of a relationship here is unclear, because very few responding institutions award the doctorate in the sciences), and are very slightly superior in institutions that offer an academic minor in the sciences.

K. Relationships between Science Degree Offerings and Science Faculty Use of Computers

In this section we examine relationships between the level of science degrees offered by minority higher education institutions and the reports of science department heads in those institutions on the percentages of faculty in their departments who use computers for various purposes. These relationships

```
                        TABLE OF OFFA BY NEWSKL1

OFFA      IS SCIENCE ASSOCIATE DEGREE OFFERED    NEWSKL1   PERC NEW STUD NO COMPUTER SKILLS

FREQUENCY| Percent of Newly Entering Students with No Computer Training or Skills
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20% |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
  .      |     20 |      5 |      6 |      3 |      3 |      3 |     16 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     30 |      3 |      5 |      4 |      5 |      7 |     20 |     44
         |      . |   3.30 |   5.49 |   4.40 |   5.49 |   7.69 |  21.98 |  48.35
         |      . |   6.82 |  11.36 |   9.09 |  11.36 |  15.91 |  45.45 |
         |      . |  25.00 |  33.33 |  50.00 |  83.33 |  46.67 |  57.14 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     26 |      9 |     10 |      4 |      1 |      8 |     15 |     47
         |      . |   9.89 |  10.99 |   4.40 |   1.10 |   8.79 |  16.48 |  51.65
         |      . |  19.15 |  21.28 |   8.51 |   2.13 |  17.02 |  31.91 |
         |      . |  75.00 |  66.67 |  50.00 |  16.67 |  53.33 |  42.86 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       12       15        8        6       15       35       91
                .    13.19    16.48     8.79     6.59    16.48    38.46   100.00
```

Science Associate Degrees Offered

Table 318. Number and percent of institutions offering an associate degree in science, by institutions with various percents of newly entering students with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

TABLE OF OFFA BY NEWSKL2

Science Associate Degrees Offered

```
OFFA     IS SCIENCE ASSOCIATE DEGREE OFFERED    NEWSKL2    PERC NEW STUD GENL AWARE OF COMPUTERS

FREQUENCY| Percent of Newly Entering Students with General Awareness of Computers
PERCENT  |
ROW PCT  |
COL PCT  |      .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|   TOTAL
---------+-------+--------+--------+--------+--------+--------+--------+
   .     |    20 |      9 |     11 |      3 |      4 |      3 |      6 |      .
         |     . |      . |      . |      . |      . |      . |      . |      .
         |     . |      . |      . |      . |      . |      . |      . |
         |     . |      . |      . |      . |      . |      . |      . |
---------+-------+--------+--------+--------+--------+--------+--------+
YES      |    30 |      7 |     23 |      2 |      6 |      4 |      2 |     44
         |     . |   7.69 |  25.27 |   2.20 |   6.59 |   4.40 |   2.20 |  48.35
         |     . |  15.91 |  52.27 |   4.55 |  13.64 |   9.09 |   4.55 |
         |     . |  41.18 |  65.71 |  22.22 |  66.67 |  57.14 |  14.29 |
---------+-------+--------+--------+--------+--------+--------+--------+
NO       |    26 |     10 |     12 |      7 |      3 |      3 |     12 |     47
         |     . |  10.99 |  13.19 |   7.69 |   3.30 |   3.30 |  13.19 |  51.65
         |     . |  21.28 |  25.53 |  14.89 |   6.38 |   6.38 |  25.53 |
         |     . |  58.82 |  34.29 |  77.78 |  33.33 |  42.86 |  85.71 |
---------+-------+--------+--------+--------+--------+--------+--------+
TOTAL          .       17       35        9        9        7       14       91
               .    18.68    38.46     9.89     9.89     7.69    15.38   100.00
```

Table 319. Number and percent of institutions offering an associate degree in science, by institutions with various percents of newly entering students with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF OFFA BY NEWSKL3

OFFA        IS SCIENCE ASSOCIATE DEGREE OFFERED    NEWSKL3    F

FREQUENCY| Percent of Newly Entering Students with Limited
PERCENT  |        Personal Computer Use and Skill
ROW PCT  |
COL PCT  |       .|       0|1%-20% |21%-40% |  TOTAL
---------+--------+--------+--------+--------+
   .     |      20 |     17 |     17 |      2 |     .
         |       . |      . |      . |      . |     .
         |       . |      . |      . |      . |
         |       . |      . |      . |      . |
---------+--------+--------+--------+--------+
YES      |      30 |     17 |     24 |      3 |    44
         |       . |  18.68 |  26.37 |   3.30 |  48.35
         |       . |  38.64 |  54.55 |   6.82 |
         |       . |  47.22 |  52.17 |  33.33 |
---------+--------+--------+--------+--------+
NO       |      26 |     19 |     22 |      6 |    47
         |       . |  20.88 |  24.18 |   6.59 |  51.65
         |       . |  40.43 |  46.81 |  12.77 |
         |       . |  52.78 |  47.83 |  66.67 |
---------+--------+--------+--------+--------+
TOTAL           .       36       46        9       91
                .    39.56    50.55     9.89   100.00
```

Science Associate Degrees Offered

Table 320. Number and percent of institutions offering an associate degree in science, by institutions with various percents of newly entering students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF OFFA BY NEWSKL4

OFFA       IS SCIENCE ASSOCIATE DEGREE OFFERED   NEWSKL4   PERC NEW STUD WHO CAN PROGRAM COMPUT

FREQUENCY|  Percent of Newly Entering Students with Ability to Program a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|        0|1%-20%  |21%-40% |41%-60% |81%-100%|  TOTAL
---------+--------+---------+--------+--------+--------+--------+
 .       |     20 |      25 |     10 |      0 |      0 |      0 |      .
         |      . |       . |      . |      . |      . |      . |      .
         |      . |       . |      . |      . |      . |      . |
         |      . |       . |      . |      . |      . |      . |
---------+--------+---------+--------+--------+--------+--------+
YES      |     30 |      20 |     22 |      0 |      1 |      1 |     44
         |      . |   21.98 |  24.18 |   0.00 |   1.10 |   1.10 |  48.35
         |      . |   45.45 |  50.00 |   0.00 |   2.27 |   2.27 |
         |      . |   41.67 |  56.41 |   0.00 | 100.00 | 100.00 |
---------+--------+---------+--------+--------+--------+--------+
NO       |     26 |      28 |     17 |      2 |      0 |      0 |     47
         |      . |   30.77 |  18.68 |   2.20 |   0.00 |   0.00 |  51.65
         |      . |   59.57 |  36.17 |   4.26 |   0.00 |   0.00 |
         |      . |   58.33 |  43.59 | 100.00 |   0.00 |   0.00 |
---------+--------+---------+--------+--------+--------+--------+
TOTAL             .        48       39        2        1        1       91
                  .     52.75    42.86     2.20     1.10     1.10   100.00
```

Science Associate Degrees Offered

Table 321. Number and percent of institutions offering an associate degree in science, by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
[illegible]FA      IS SCIENCE ASSOCIATE DEGREE OFFER[illegible]   OLDSKL1   PERC CURRENT STUD NO COMPUTE[illegible]SKILLS

FREQUENCY| Percent of Currently Enrolled Students with No Computer Training or Skills
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     20 |     10 |      8 |      4 |      2 |      6 |      6 |     .
         |      . |      . |      . |      . |      . |      . |      . |     .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     29 |      6 |     10 |     12 |      5 |      3 |      9 |    45
         |      . |   6.45 |  10.75 |  12.90 |   5.38 |   3.23 |   9.68 |  48.39
         |      . |  13.33 |  22.22 |  26.67 |  11.11 |   6.67 |  20.00 |
         |      . |  25.00 |  52.63 |  70.59 |  50.00 |  33.33 |  64.29 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     25 |     18 |      9 |      5 |      5 |      6 |      5 |    48
         |      . |  19.35 |   9.68 |   5.38 |   5.38 |   6.45 |   5.38 |  51.61
         |      . |  37.50 |  18.75 |  10.42 |  10.42 |  12.50 |  10.42 |
         |      . |  75.00 |  47.37 |  29.41 |  50.00 |  66.67 |  35.71 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL          .       24       19       17       10        9       14       93
               .    25.81    20.43    18.28    10.75     9.68    15.05   100.00
```

Science Associate Degrees Offered

Table 322. Number and percent of institutions offering an associate degree in science, by institutions with various percents of currently enrolled students with no computer training or skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
OFFA      IS SCIENCE ASSOCIATE DEGREE OFFERED   OLDSKL2   PERC CURRENT STUD GENL AWARE COMPUTERS

FREQUENCY|
PERCENT  | Percent of Currently Enrolled Students with General Awareness of Computers
ROW PCT  |
COL PCT  |        .|       0|1%-20%  |21%-40%  |41%-60%  |61%-80%  |81%-100%|  TOTAL
---------+---------+---------+---------+---------+---------+---------+---------+
   .     |      20 |       8 |      15 |       5 |       4 |       3 |       1 |     .
         |       . |       . |       . |       . |       . |       . |       . |     .
         |       . |       . |       . |       . |       . |       . |       . |
         |       . |       . |       . |       . |       . |       . |       . |
---------+---------+---------+---------+---------+---------+---------+---------+
YES      |      29 |       8 |      17 |       9 |       9 |       1 |       1 |     45
         |       . |    8.60 |   18.28 |    9.68 |    9.68 |    1.08 |    1.08 |  48.39
         |       . |   17.78 |   37.78 |   20.00 |   20.00 |    2.22 |    2.22 |
         |       . |   50.00 |   53.13 |   39.13 |   90.00 |   12.50 |   25.00 |
---------+---------+---------+---------+---------+---------+---------+---------+
NO       |      25 |       8 |      15 |      14 |       1 |       7 |       3 |     48
         |       . |    8.60 |   16.13 |   15.05 |    1.08 |    7.53 |    3.23 |  51.61
         |       . |   16.67 |   31.25 |   29.17 |    2.08 |   14.58 |    6.25 |
         |       . |   50.00 |   46.88 |   60.87 |   10.00 |   87.50 |   75.00 |
---------+---------+---------+---------+---------+---------+---------+---------+
TOTAL            .        16        32        23        10         8         4       93
                 .     17.20     34.41     24.73     10.75      8.60      4.30   100.00
```

Science Associate Degrees Offered

Table 323. Number and percent of institutions offering an associate degree in science, by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

FA IS SCIENCE ASSOCIATE DEGREE OFFER OLDSKL3 PERC CURRENT STUD LIMITED COMPUTER USE

Science Associate Degrees Offered

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Currently Enrolled Students with Limited Personal Computer Use and Skill							
	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20	9	19	3	2	1	2	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
YES	29	10	27	4	3	0	1	45
	.	10.75	29.03	4.30	3.23	.	1.08	48.39
	.	22.22	60.00	8.89	6.67	.	2.22	
	.	58.82	50.94	28.57	42.86	.	50.00	
NO	25	7	26	10	4	0	1	48
	.	7.53	27.96	10.75	4.30	.	1.08	51.61
	.	14.58	54.17	20.83	8.33	.	2.08	
	.	41.18	49.06	71.43	57.14	.	50.00	
TOTAL	.	17	53	14	7	.	2	93
	.	18.28	56.99	15.05	7.53	.	2.15	100.00

Table 324. Number and percent of institutions offering an associate degree in science, by institutions with various percents of currently enrolled students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
OFFA      IS SCIENCE ASSOCIATE DEGREE OFFERED   OLDSKL4   PERC CURRENT STUD WHO CAN PROGRAM COMP

FREQUENCY|  Percent of Currently Enrolled Students with Ability to Program a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     20 |     11 |     14 |      5 |      4 |      1 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     29 |     10 |     24 |      5 |      1 |      3 |      2 |     45
         |      . |  10.75 |  25.81 |   5.38 |   1.08 |   3.23 |   2.15 |  48.39
         |      . |  22.22 |  53.33 |  11.11 |   2.22 |   6.67 |   4.44 |
         |      . |  43.48 |  54.55 |  45.45 |  14.29 |  75.00 |  30.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     25 |     13 |     20 |      6 |      6 |      1 |      2 |     48
         |      . |  13.98 |  21.51 |   6.45 |   6.45 |   1.08 |   2.15 |  51.61
         |      . |  27.08 |  41.67 |  12.50 |  12.50 |   2.08 |   4.17 |
         |      . |  56.52 |  45.45 |  54.55 |  85.71 |  25.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       23       44       11        7        4        4       93
                .    24.73    47.31    11.83     7.53     4.30     4.30   100.00
```

Science Associate Degrees Offered

Table 325. Number and percent of institutions offering an associate degree in science, by institutions with various percents of currently enrolled students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
[illegible]FA      IS SCIENCE ASSOCIATE DEGREE OFFERED   FACSKL1   PERCENT FACULTY NO COMPUTER SKILLS

FREQUENCY|        Percent of Faculty with No Computer Training or Skills
 PERCENT |
 ROW PCT |
 COL PCT |        .|        0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+---------+---------+--------+--------+--------+--------+--------+
   .     |      20 |      23 |      6 |      3 |      2 |      2 |      0 |     .
         |       . |       . |      . |      . |      . |      . |      . |     .
         |       . |       . |      . |      . |      . |      . |      . |
         |       . |       . |      . |      . |      . |      . |      . |
---------+---------+---------+--------+--------+--------+--------+--------+
YES      |      29 |      28 |      6 |      4 |      3 |      2 |      2 |    45
         |       . |   29.47 |   6.32 |   4.21 |   3.16 |   2.11 |   2.11 |  47.37
         |       . |   62.22 |  13.33 |   8.89 |   6.67 |   4.44 |   4.44 |
         |       . |   47.46 |  54.55 |  36.36 |  50.00 |  50.00 |  50.00 |
---------+---------+---------+--------+--------+--------+--------+--------+
NO       |      23 |      31 |      5 |      7 |      3 |      2 |      2 |    50
         |       . |   32.63 |   5.26 |   7.37 |   3.16 |   2.11 |   2.11 |  52.63
         |       . |   62.00 |  10.00 |  14.00 |   6.00 |   4.00 |   4.00 |
         |       . |   52.54 |  45.45 |  63.64 |  50.00 |  50.00 |  50.00 |
---------+---------+---------+--------+--------+--------+--------+--------+
TOTAL             .        59       11       11        6        4        4     95
                  .     62.11    11.58    11.58     6.32     4.21     4.21  100.00
```

Science Associate Degrees Offered

Table 326 . Number and percent of institutions offering an associate degree in science, by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
OFFA      IS SCIENCE ASSOCIATE DEGREE OFFERED   FACSKL2   PERC FACULTY GENL AWARE OF COMPUTERS

FREQUENCY|
 PERCENT |
 ROW PCT |
 COL PCT |        .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |     20 |     13 |      5 |      7 |      3 |      6 |      2 |     .
         |      . |      . |      . |      . |      . |      . |      . |     .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     29 |      9 |     16 |      6 |      9 |      5 |      0 |     45
         |      . |   9.47 |  16.84 |   6.32 |   9.47 |   5.26 |   0.00 |  47.37
         |      . |  20.00 |  35.56 |  13.33 |  20.00 |  11.11 |   0.00 |
         |      . |  40.91 |  69.57 |  24.00 |  56.25 |  62.50 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     23 |     13 |      7 |     19 |      7 |      3 |      1 |     50
         |      . |  13.68 |   7.37 |  20.00 |   7.37 |   3.16 |   1.05 |  52.63
         |      . |  26.00 |  14.00 |  38.00 |  14.00 |   6.00 |   2.00 |
         |      . |  59.09 |  30.43 |  76.00 |  43.75 |  37.50 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       22       23       25       16        8        1       95
                .    23.16    24.21    26.32    16.84     8.42     1.05   100.00
```

Percent of Faculty with General Awareness of Computers

Science Associate Degrees Offered

Table 327. Number and percent of institutions offering an associate degree in science, by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

FFA IS SCIENCE ASSOCIATE DEGREE OFFERED FACSKL3 PERC FACULTY LIMITED COMPUTER USE-SKILL

Science Associate Degrees Offered

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Faculty with Limited Personal Computer Use and Skill .	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	8 . . .	18 . . .	5 . . .	4 . . .	0 . . .	1 . . .	. .
YES	29 . . .	9 9.47 20.00 50.00	18 18.95 40.00 51.43	7 7.37 15.56 29.17	6 6.32 13.33 50.00	3 3.16 6.67 75.00	2 2.11 4.44 100.00	45 47.37
NO	23 . . .	9 9.47 18.00 50.00	17 17.89 34.00 48.57	17 17.89 34.00 70.83	6 6.32 12.00 50.00	1 1.05 2.00 25.00	0 0.00 0.00 0.00	50 52.63
TOTAL	. .	18 18.95	35 36.84	24 25.26	12 12.63	4 4.21	2 2.11	95 100.00

Table 328. Number and percent of institutions offering an associate degree in science, by institutions with various percents of faculty with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

TABLE OF OFFA BY FACSKL4

OFFA   IS SCIENCE ASSOCIATE DEGREE OFFERED   FACSKL4   PERC FACULTY WHO CAN PROGRAM COMPUTER

Percent of Faculty with Ability to Program a Computer

Science Associate Degrees Offered

```
FREQUENCY|
PERCENT  I
ROW PCT  I
COL PCT  I       .I       0I1%-20% I21%-40% I41%-60% I61%-80% I81%-100%I  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    I     20 I      6 I      9 I      6 I      6 I      3 I      6 I      .
         I      . I      . I      . I      . I      . I      . I      . I      .
         I      . I      . I      . I      . I      . I      . I      . I
         I      . I      . I      . I      . I      . I      . I      . I
---------+--------+--------+--------+--------+--------+--------+--------+
YES      I     29 I      7 I     12 I     15 I      4 I      2 I      5 I     45
         I      . I   7.37 I  12.63 I  15.79 I   4.21 I   2.11 I   5.26 I  47.37
         I      . I  15.56 I  26.67 I  33.33 I   8.89 I   4.44 I  11.11 I
         I      . I  53.85 I  42.86 I  57.69 I  33.33 I  50.00 I  41.67 I
---------+--------+--------+--------+--------+--------+--------+--------+
NO       I     23 I      6 I     16 I     11 I      8 I      2 I      7 I     50
         I      . I   6.32 I  16.84 I  11.58 I   8.42 I   2.11 I   7.37 I  52.63
         I      . I  12.00 I  32.00 I  22.00 I  16.00 I   4.00 I  14.00 I
         I      . I  46.15 I  57.14 I  42.31 I  66.67 I  50.00 I  58.33 I
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       13       28       26       12        4       12       95
                .    13.68    29.47    27.37    12.63     4.21    12.63   100.00
```

Table 329. Number and percent of institutions offering an associate degree in science, by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Newly Entering Students with No Computer Training or Skills

Science Bachelor Degrees Offered

```
                      TABLE OF OFFB BY NEWSKL1

OF       IS SCIENCE BACHELORS OFFERED   NEWS      PERC NEW STUD NO COMPUTER SKILLS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     20 |      5 |      6 |      4 |      4 |      4 |     17 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     24 |     12 |     12 |      5 |      3 |     11 |     21 |     64
         |      . |  13.79 |  13.79 |   5.75 |   3.45 |  12.64 |  24.14 |  73.56
         |      . |  18.75 |  18.75 |   7.81 |   4.69 |  17.19 |  32.81 |
         |      . | 100.00 |  80.00 |  71.43 |  60.00 |  78.57 |  61.76 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     32 |      0 |      3 |      2 |      2 |      3 |     13 |     23
         |      . |   0.00 |   3.45 |   2.30 |   2.30 |   3.45 |  14.94 |  26.44
         |      . |   0.00 |  13.04 |   8.70 |   8.70 |  13.04 |  56.52 |
         |      . |   0.00 |  20.00 |  28.57 |  40.00 |  21.43 |  38.24 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       12       15        7        5       14       34       87
                .    13.79    17.24     8.05     5.75    16.09    39.08   100.00
```

Table 330. Number and percent of institutions offering a bachelors degree in science, by institutions with various percents or newly entering students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF OFFB BY NEWSKL2

OFFB      IS SCIENCE BACHELORS OFFERED   NEWSKL2   PERC NEW STUD GENL AWARE OF COMPUTERS

FREQUENCY|  Percent of Newly Entering Students with General Awareness of Computers
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |     20 |      9 |     13 |      3 |      5 |      4 |      6 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     24 |     12 |     22 |      7 |      7 |      5 |     11 |     64
         |      . |  13.79 |  25.29 |   8.05 |   8.05 |   5.75 |  12.64 |  73.56
         |      . |  18.75 |  34.38 |  10.94 |  10.94 |   7.81 |  17.19 |
         |      . |  70.59 |  66.67 |  77.78 |  87.50 |  83.33 |  78.57 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     32 |      5 |     11 |      2 |      1 |      1 |      3 |     23
         |      . |   5.75 |  12.64 |   2.30 |   1.15 |   1.15 |   3.45 |  26.44
         |      . |  21.74 |  47.83 |   8.70 |   4.35 |   4.35 |  13.04 |
         |      . |  29.41 |  33.33 |  22.22 |  12.50 |  16.67 |  21.43 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       17       33        9        8        6       14       87
                .    19.54    37.93    10.34     9.20     6.90    16.09   100.00
```

Science Bachelor Degrees Offered

Table 331. Number and percent of institutions offering a bachelors degree in science, by institutions with various percents of newly entering students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                       TABLE OF OFFB BY NEWSKL3

OFFB      IS SCIENCE BACHELORS OFFERED   NEWSKL3   PERC NEW ST

FREQUENCY| Percent of Newly Entering Students with Limited
PERCENT  | Personal Computer Use and Skills
ROW PCT  |
COL PCT  |        .|       0|1%-20%  |21%-40%  |  TOTAL
---------+---------+---------+---------+---------+
   .     |      20 |      20 |      18 |       2 |      .
         |       . |       . |       . |       . |      .
         |       . |       . |       . |       . |
         |       . |       . |       . |       . |
---------+---------+---------+---------+---------+
YES      |      24 |      24 |      31 |       9 |     64
         |       . |   27.59 |   35.63 |   10.34 |  73.56
         |       . |   37.50 |   48.44 |   14.06 |
         |       . |   72.73 |   68.89 |  100.00 |
---------+---------+---------+---------+---------+
NO       |      32 |       9 |      14 |       0 |     23
         |       . |   10.34 |   16.09 |    0.00 |  26.44
         |       . |   39.13 |   60.87 |    0.00 |
         |       . |   27.27 |   31.11 |    0.00 |
---------+---------+---------+---------+---------+
TOTAL            .        33        45         9       87
                 .     37.93     51.72     10.34   100.00
```

Science Bachelor Degrees Offered

Table 332. Number and percent of institutions offering a bachelors degree in science, by institutions with various percents of newly entering students with limited personal computer use and skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions

```
                              TABLE OF OFFB BY NEWSKL4

OFFB      IS SCIENCE BACHELORS OFFERED    NEWSKL4    PERC NEW STUD WHO CAN PROGRAM COMPUTER

FREQUENCY|  Percent of Newly Entering Students with Ability to Program a Computer
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+
   .     |      20 |     27 |     13 |      0 |      0 |      0 |      .
         |       . |      . |      . |      . |      . |      . |      .
         |       . |      . |      . |      . |      . |      . |
         |       . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+
YES      |      24 |     36 |     24 |      2 |      1 |      1 |     64
         |       . |  41.38 |  27.59 |   2.30 |   1.15 |   1.15 |  73.56
         |       . |  56.25 |  37.50 |   3.13 |   1.56 |   1.56 |
         |       . |  76.60 |  66.67 | 100.00 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+
NO       |      32 |     11 |     12 |      0 |      0 |      0 |     23
         |       . |  12.64 |  13.79 |   0.00 |   0.00 |   0.00 |  26.44
         |       . |  47.83 |  52.17 |   0.00 |   0.00 |   0.00 |
         |       . |  23.40 |  33.33 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+
TOTAL            .       47       36        2        1        1       87
                 .    54.02    41.38     2.30     1.15     1.15   100.00
```

Science Bachelor Degrees Offered

Table 333 . Number and percent of institutions offering a bachelors degree in science, by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                                   TABLE OF OFFB BY OLDSKL1

O[illegible]B      IS SCIENCE BACHELORS OFFERED   OLD[illegible]1   PERC CURRENT STUD NO COMPUTER SKILLS

FREQUENCY|  Percent of Currently Enrolled Students with No Computer Training or Skills
 PERCENT |
 ROW PCT |
 COL PCT |        .|        0|1%-20%   |21%-40%  |41%-60%  |61%-80%  |81%-100%|  TOTAL
---------+---------+---------+---------+---------+---------+---------+---------+
    .    |      20 |      11 |       8 |       6 |       3 |       5 |       7 |      .
         |       . |       . |       . |       . |       . |       . |       . |      .
         |       . |       . |       . |       . |       . |       . |       . |
         |       . |       . |       . |       . |       . |       . |       . |
---------+---------+---------+---------+---------+---------+---------+---------+
YES      |      22 |      21 |      16 |      10 |       6 |       7 |       6 |     66
         |       . |   23.60 |   17.98 |   11.24 |    6.74 |    7.87 |    6.74 |  74.16
         |       . |   31.82 |   24.24 |   15.15 |    9.09 |   10.61 |    9.09 |
         |       . |   91.30 |   84.21 |   66.67 |   66.67 |   70.00 |   46.15 |
---------+---------+---------+---------+---------+---------+---------+---------+
NO       |      32 |       2 |       3 |       5 |       3 |       3 |       7 |     23
         |       . |    2.25 |    3.37 |    5.62 |    3.37 |    3.37 |    7.87 |  25.84
         |       . |    8.70 |   13.04 |   21.74 |   13.04 |   13.04 |   30.43 |
         |       . |    8.70 |   15.79 |   33.33 |   33.33 |   30.00 |   53.85 |
---------+---------+---------+---------+---------+---------+---------+---------+
TOTAL             .       23        19        15         9        10        13       89
                  .    25.84     21.35     16.85     10.11     11.24     14.61   100.00
```

Science Bachelor Degrees Offered

Table 334 . Number and percent of institutions offering a bachelors degree in science, by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF OFFB BY OLDSKL2

OFFB      IS SCIENCE BACHELORS OFFERED   OLDSKL2   PERC CURRENT STUD GENL AWARE COMPUTERS

FREQUENCY| Percent of Currently Enrolled Students with General Awareness of Computers
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
  .      |     20 |      8 |     17 |      5 |      6 |      3 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     22 |     10 |     22 |     18 |      7 |      5 |      4 |     66
         |      . |  11.24 |  24.72 |  20.22 |   7.87 |   5.62 |   4.49 |  74.16
         |      . |  15.15 |  33.33 |  27.27 |  10.61 |   7.58 |   6.06 |
         |      . |  62.50 |  73.33 |  78.26 |  87.50 |  62.50 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     32 |      6 |      8 |      5 |      1 |      3 |      0 |     23
         |      . |   6.74 |   8.99 |   5.62 |   1.12 |   3.37 |   0.00 |  25.84
         |      . |  26.09 |  34.78 |  21.74 |   4.35 |  13.04 |   0.00 |
         |      . |  37.50 |  26.67 |  21.74 |  12.50 |  37.50 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       16       30       23        8        8        4       89
                .    17.98    33.71    25.84     8.99     8.99     4.49   100.00
```

Science Bachelor Degrees Offered

Table 335. Number and percent of institutions offering a bachelors degree in science, by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

TABLE OF OFFB BY QSKL3

FFB IS SCIENCE BACHELORS OFFERED Q SKL3 PERC CURRENT STUD LIMITED COMPUTER SE

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Currently Enrolled Students with Limited Personal Computer Use and Skills							
Science Bachelor Degrees Offered	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	20 . . .	10 . . .	22 . . .	3 . . .	2 . . .	1 . . .	2 . . .	. .
YES	22 . . .	9 10,11 13,64 56,25	38 42,70 57,58 76,00	14 15,73 21,21 100,00	4 4,49 6,06 57,14	0 . . .	1 1,12 1,52 50,00	66 74,16
NO	32 . . .	7 7,87 30,43 43,75	12 13,48 52,17 24,00	0 0,00 0,00 0,00	3 3,37 13,04 42,86	0 . . .	1 1,12 4,35 50,00	23 25,84
TOTAL	. .	16 17,98	50 56,18	14 15,73	7 7,87	. .	2 2,25	89 100,00

Table 336. Number and percent of institutions offering a bachelors degree in science, by institutions with various percents of currently enrolled students with limited personal computer use and skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                               TABLE OF OFFB BY OLDSKL4

OFFB      IS SCIENCE BACHELORS OFFERED   OLDSKL4   PERC CURRENT STUD WHO CAN PROGRAM COMP

FREQUENCY|  Percent of Currently Enrolled Students with Ability to Program a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20% |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     20 |     12 |     16 |      5 |      4 |      2 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     22 |     14 |     28 |     11 |      7 |      3 |      3 |     66
         |      . |  15.73 |  31.46 |  12.36 |   7.87 |   3.37 |   3.37 |  74.16
         |      . |  21.21 |  42.42 |  16.67 |  10.61 |   4.55 |   4.55 |
         |      . |  63.64 |  66.67 | 100.00 | 100.00 | 100.00 |  75.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     32 |      8 |     14 |      0 |      0 |      0 |      1 |     23
         |      . |   8.99 |  15.73 |   0.00 |   0.00 |   0.00 |   1.12 |  25.84
         |      . |  34.78 |  60.87 |   0.00 |   0.00 |   0.00 |   4.35 |
         |      . |  36.36 |  33.33 |   0.00 |   0.00 |   0.00 |  25.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       22       42       11        7        3        4       89
                .    24.72    47.19    12.36     7.87     3.37     4.49   100.00
```

Science Bachelor Degrees Offered

Table 337 . Number and percent of institutions offering a bachelors degree in science, by institutions with various percents of currently enrolled students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

FFB IS SCIENCE BACHELORS OFFERED F KL1 PERCENT FACULTY NO COMPUTER SKILLS

Percent of Faculty with No Computer Training or Skills

Science Bachelor Degrees Offered	FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.		20 . . .	26 . . .	7 . . .	3 . . .	2 . . .	1 . . .	1 . . .	. .
YES		20 . . .	41 45.05 60.29 73.21	6 6.59 8.82 60.00	10 10.99 14.71 90.91	4 4.40 5.88 66.67	4 4.40 5.88 80.00	3 3.30 4.41 100.00	68 74.73
NO		32 . . .	15 16.48 65.22 26.79	4 4.40 17.39 40.00	1 1.10 4.35 9.09	2 2.20 8.70 33.33	1 1.10 4.35 20.00	0 0.00 0.00 0.00	23 25.27
TOTAL		. .	56 61.54	10 10.99	11 12.09	6 6.59	5 5.49	3 3.30	91 100.00

Table 338. Number and percent of institutions offering a bachelors degree in science, by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF OFFB BY FACSKL2

OFFB      IS SCIENCE BACHELCRS OFFERED   FACSKL2   PERC FACULTY GENL AWARE OF COMPUTERS

FREQUENCY|  Percent of Faculty with General Awareness of Computers
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     20 |     14 |      6 |      8 |      3 |      7 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     20 |     11 |     18 |     22 |     12 |      4 |      1 |     68
         |      . |  12.09 |  19.78 |  24.18 |  13.19 |   4.40 |   1.10 |  74.73
         |      . |  16.18 |  26.47 |  32.35 |  17.65 |   5.88 |   1.47 |
         |      . |  52.38 |  81.82 |  91.67 |  75.00 |  57.14 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     32 |     10 |      4 |      2 |      4 |      3 |      0 |     23
         |      . |  10.99 |   4.40 |   2.20 |   4.40 |   3.30 |   0.00 |  25.27
         |      . |  43.48 |  17.39 |   8.70 |  17.39 |  13.04 |   0.00 |
         |      . |  47.62 |  18.18 |   8.33 |  25.00 |  42.86 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       21       22       24       16        7        1       91
                .    23.08    24.18    26.37    17.58     7.69     1.10   100.00
```

Science Bachelor Degrees Offered

Table 339. Number and percent of institutions offering a bachelors degree in science, by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF OFFB BY FACSKL3

OFFB      IS SCIENCE BACHELCRS OFFERED   FACSKL3   PERC FACULTY LIMITED COMPUTER USE-SKILL

FREQUENCY| Percent of Faculty with Limited Personal Computer Use and Skill
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |      20|      10|      18|       7|       4|       0|       1|       .
         |       .|       .|       .|       .|       .|       .|       .|       .
         |       .|       .|       .|       .|       .|       .|       .|
         |       .|       .|       .|       .|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      20|       9|      27|      22|       7|       3|       0|      68
         |       .|    9.89|   29.67|   24.18|    7.69|    3.30|    0.00|   74.73
         |       .|   13.24|   39.71|   32.35|   10.29|    4.41|    0.00|
         |       .|   56.25|   77.14|  100.00|   58.33|   75.00|    0.00|
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |      32|       7|       8|       0|       5|       1|       2|      23
         |       .|    7.69|    8.79|    0.00|    5.49|    1.10|    2.20|   25.27
         |       .|   30.43|   34.78|    0.00|   21.74|    4.35|    8.70|
         |       .|   43.75|   22.86|    0.00|   41.67|   25.00|  100.00|
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL            .       16       35       22       12        4        2       91
                 .    17.58    38.46    24.18    13.19     4.40     2.20   100.00
```

Science Bachelor Degrees Offered

Table 340. Number and percent of institutions offering a bachelors degree in science, by institutions with various percents of faculty with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                        TABLE OF OFFB BY FACSKL4

OFFB     IS SCIENCE BACHELORS OFFERED   FACSKL4   PERC FACULTY WHO CAN PROGRAM COMPUTER

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |     20 |      6 |     10 |      7 |      7 |      3 |      7 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     20 |      8 |     23 |     19 |      8 |      4 |      6 |     68
         |      . |   8.79 |  25.27 |  20.88 |   8.79 |   4.40 |   6.59 |  74.73
         |      . |  11.76 |  33.82 |  27.94 |  11.76 |   5.88 |   8.82 |
         |      . |  61.54 |  85.19 |  76.00 |  72.73 | 100.00 |  54.55 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     32 |      5 |      4 |      6 |      3 |      0 |      5 |     23
         |      . |   5.49 |   4.40 |   6.59 |   3.30 |   0.00 |   5.49 |  25.27
         |      . |  21.74 |  17.39 |  26.09 |  13.04 |   0.00 |  21.74 |
         |      . |  38.46 |  14.81 |  24.00 |  27.27 |   0.00 |  45.45 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       13       27       25       11        4       11       91
                .    14.29    29.67    27.47    12.09     4.40    12.09   100.00
```

Percent of Faculty with Ability to Program a Computer

Science Bachelor Degrees Offered

Table 341. Number and percent of institutions offering a bachelors degree in science, by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic, vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF OFFM BY NEWSKL1

OFFM      IS SCIENCE MASTERS OFFERED   NEWSKL1   PERC NEW STUD NO COMPUTER SKILLS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     22 |      5 |      6 |      4 |      4 |      4 |     17 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      7 |      5 |      7 |      2 |      2 |      7 |      9 |     32
         |      . |   5.75 |   8.05 |   2.30 |   2.30 |   8.05 |  10.34 |  36.78
         |      . |  15.63 |  21.88 |   6.25 |   6.25 |  21.88 |  28.13 |
         |      . |  41.67 |  46.67 |  28.57 |  40.00 |  50.00 |  26.47 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     47 |      7 |      8 |      5 |      3 |      7 |     25 |     55
         |      . |   8.05 |   9.20 |   5.75 |   3.45 |   8.05 |  28.74 |  63.22
         |      . |  12.73 |  14.55 |   9.09 |   5.45 |  12.73 |  45.45 |
         |      . |  58.33 |  53.33 |  71.43 |  60.00 |  50.00 |  73.53 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       12       15        7        5       14       34       87
                .    13.79    17.24     8.05     5.75    16.09    39.08   100.00
```

Percent of Newly Entering Students with No Computer Training or Skills

Science Masters Degrees Offered

Table 342. Number and percent of institutions offering a masters degree in science, by institutions with various percents of newly entering students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF OFFM BY NEWSKL2

OFFM      IS SCIENCE MASTERS OFFERED   NEWSKL2   PERC NEW STUD GENL AWARE OF COMPUTERS

FREQUENCY|  Percent of Newly Entering Students with General Awareness of Computers
 PERCENT |
 ROW PCT |
 COL PCT |        .|        0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |      22 |       9 |      13 |       3 |       5 |       4 |       6 |       .
         |       . |       . |       . |       . |       . |       . |       . |       .
         |       . |       . |       . |       . |       . |       . |       . |
         |       . |       . |       . |       . |       . |       . |       . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |       7 |       7 |      12 |       4 |       3 |       3 |       3 |      32
         |       . |    8.05 |   13.79 |    4.60 |    3.45 |    3.45 |    3.45 |   36.78
         |       . |   21.88 |   37.50 |   12.50 |    9.38 |    9.38 |    9.38 |
         |       . |   41.18 |   36.36 |   44.44 |   37.50 |   50.00 |   21.43 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |      47 |      10 |      21 |       5 |       5 |       3 |      11 |      55
         |       . |   11.49 |   24.14 |    5.75 |    5.75 |    3.45 |   12.64 |   63.22
         |       . |   18.18 |   38.18 |    9.09 |    9.09 |    5.45 |   20.00 |
         |       . |   58.82 |   63.64 |   55.56 |   62.50 |   50.00 |   78.57 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL              .       17       33        9        8        6       14       87
                   .    19.54    37.93    10.34     9.20     6.90    16.09   100.00
```

Science Masters Degrees Offered

Table 343 . Number and percent of institutions offering a masters degree in science, by institutions with various percents of newly entering students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

-453-

Percent of Newly Entering Students with Limited Personal Computer Use and Skills

Science Masters Degrees Offered

```
                    TABLE OF OFFM BY NEWSKL3

OFFM      IS SCIENCE MASTERS OFFERED   NEWSKL3   PERC NEW STUD

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |  TOTAL
---------+--------+--------+--------+--------+
   .     |     22 |     20 |     18 |      2 |      .
         |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |
         |      . |      . |      . |      . |
---------+--------+--------+--------+--------+
YES      |      7 |      8 |     19 |      5 |     32
         |      . |   9.20 |  21.84 |   5.75 |  36.78
         |      . |  25.00 |  59.38 |  15.63 |
         |      . |  24.24 |  42.22 |  55.56 |
---------+--------+--------+--------+--------+
NO       |     47 |     25 |     26 |      4 |     55
         |      . |  28.74 |  29.89 |   4.60 |  63.22
         |      . |  45.45 |  47.27 |   7.27 |
         |      . |  75.76 |  57.78 |  44.44 |
---------+--------+--------+--------+--------+
TOTAL           .       33       45        9       87
                .    37.93    51.72    10.34   100.00
```

Table 344. Number and percent of institutions offering a masters degree in science, by institutions with various percents of newly entering students with limited personal computer use and skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                 S T A T I S T I C A L   A N A L Y S I S   S Y S T E M                          21:3

                                   TABLE OF OFFM BY NEWSKL4

OFFM        IS SCIENCE MASTERS OFFERED   NEWSKL4   PERC NEW STUD WHO CAN P

FREQUENCY|  Percent of Newly Entering Students with Ability to Program a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+
    .    |     22 |     27 |     13 |      0 |      0 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+
YES      |      7 |     14 |     15 |      1 |      1 |      1 |     32
         |      . |  16.09 |  17.24 |   1.15 |   1.15 |   1.15 |  36.78
         |      . |  43.75 |  46.88 |   3.13 |   3.13 |   3.13 |
         |      . |  29.79 |  41.67 |  50.00 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+
NO       |     47 |     33 |     21 |      1 |      0 |      0 |     55
         |      . |  37.93 |  24.14 |   1.15 |   0.00 |   0.00 |  63.22
         |      . |  60.00 |  38.18 |   1.82 |   0.00 |   0.00 |
         |      . |  70.21 |  58.33 |  50.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+
TOTAL           .       47       36        2        1        1       87
                .    54.02    41.38     2.30     1.15     1.15   100.00
```

Science Masters Degrees Offered

Table 345. Number and percent of institutions offering a masters degree in science, by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF OFFM BY OLDSKL1

OFFM      IS SCIENCE MASTERS OFFERED   OLDSKL1   PERC CURRENT STUD NO COMPUTER SKILLS

FREQUENCY| Percent of Currently Enrolled Students with No Computer Training or Skills
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
.        |     22 |     11 |      8 |      6 |      3 |      5 |      7 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      5 |      9 |     12 |      6 |      1 |      4 |      2 |     34
         |      . |  10.11 |  13.48 |   6.74 |   1.12 |   4.49 |   2.25 |  38.20
         |      . |  26.47 |  35.29 |  17.65 |   2.94 |  11.76 |   5.88 |
         |      . |  39.13 |  63.16 |  40.00 |  11.11 |  40.00 |  15.38 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     47 |     14 |      7 |      9 |      8 |      6 |     11 |     55
         |      . |  15.73 |   7.87 |  10.11 |   8.99 |   6.74 |  12.36 |  61.80
         |      . |  25.45 |  12.73 |  16.36 |  14.55 |  10.91 |  20.00 |
         |      . |  60.87 |  36.84 |  60.00 |  88.89 |  60.00 |  84.62 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       23       19       15        9       10       13       89
                .    25.84    21.35    16.85    10.11    11.24    14.61   100.00
```

Science Masters Degrees Offered

-455-

Table 346. Number and percent of institutions offering a masters degree in science, by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Science Masters Degrees Offered

```
                              TABLE OF OFFM BY OLDSKL2

OFFM      IS SCIENCE MASTERS OFFERED   OLDSKL2   PERC CURRENT STUD GENL AWARE COMPUTERS

FREQUENCY| Percent of Currently Enrolled Students with General Awareness of Computers
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |     22 |      8 |     17 |      5 |      6 |      3 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      5 |      6 |     10 |      7 |      6 |      5 |      0 |     34
         |      . |   6.74 |  11.24 |   7.87 |   6.74 |   5.62 |   0.00 |  38.20
         |      . |  17.65 |  29.41 |  20.59 |  17.65 |  14.71 |   0.00 |
         |      . |  37.50 |  33.33 |  30.43 |  75.00 |  62.50 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     47 |     10 |     20 |     16 |      2 |      3 |      4 |     55
         |      . |  11.24 |  22.47 |  17.98 |   2.25 |   3.37 |   4.49 |  61.80
         |      . |  18.18 |  36.36 |  29.09 |   3.64 |   5.45 |   7.27 |
         |      . |  62.50 |  66.67 |  69.57 |  25.00 |  37.50 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       16       30       23        8        8        4       89
                .    17.98    33.71    25.84     8.99     8.99     4.49   100.00
```

Table 347. Number and percent of institutions offering a masters degree in science, by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Science Masters Degrees Offered

```
                          TABLE OF OFFM BY OLDSKL3

OFFM      IS SCIENCE MASTERS OFFERED   OLDSKL3   PERC CURRENT STUD LIMITED COMPUTER USE

FREQUENCY|  Percent of Currently Enrolled Students with Limited Personal Computer Use
 PERCENT |                             and Skills
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     22 |     10 |     22 |      3 |      2 |      1 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      5 |      3 |     24 |      5 |      2 |      0 |      0 |     34
         |      . |   3.37 |  26.97 |   5.62 |   2.25 |      . |   0.00 |  38.20
         |      . |   8.82 |  70.59 |  14.71 |   5.88 |      . |   0.00 |
         |      . |  18.75 |  48.00 |  35.71 |  28.57 |      . |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     47 |     13 |     26 |      9 |      5 |      0 |      2 |     55
         |      . |  14.61 |  29.21 |  10.11 |   5.62 |      . |   2.25 |  61.80
         |      . |  23.64 |  47.27 |  16.36 |   9.09 |      . |   3.64 |
         |      . |  81.25 |  52.00 |  64.29 |  71.43 |      . | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       16       50       14        7        .        2       89
                .    17.98    56.18    15.73     7.87        .     2.25   100.00
```

-457-

Table 348. Number and percent of institutions offering a masters degree in science, by institutions with various percents of currently enrolled students with limited personal computer use and skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
            S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                        21:39 WEDNESDAY, SEPTEMBER

                          TABLE OF OFFM BY OLDSKL4

OFFM      IS SCIENCE MASTERS OFFERED   OLDSKL4   PERC CURRENT STUD WHO CAN PROGRAM COMP

FREQUENCY| Percent of Currently Enrolled Students with Ability to Program a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
  .      |      22 |     12 |     16 |      5 |      4 |      2 |      1 |      .
         |       . |      . |      . |      . |      . |      . |      . |      .
         |       . |      . |      . |      . |      . |      . |      . |
         |       . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |       5 |      4 |     18 |      4 |      2 |      3 |      3 |     34
         |       . |   4.49 |  20.22 |   4.49 |   2.25 |   3.37 |   3.37 |  38.20
         |       . |  11.76 |  52.94 |  11.76 |   5.88 |   8.82 |   8.82 |
         |       . |  18.18 |  42.86 |  36.36 |  28.57 | 100.00 |  75.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |      47 |     18 |     24 |      7 |      5 |      0 |      1 |     55
         |       . |  20.22 |  26.97 |   7.87 |   5.62 |   0.00 |   1.12 |  61.80
         |       . |  32.73 |  43.64 |  12.73 |   9.09 |   0.00 |   1.82 |
         |       . |  81.82 |  57.14 |  63.64 |  71.43 |   0.00 |  25.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL            .     22       42       11        7        3        4        89
                 .  24.72    47.19    12.36     7.87     3.37     4.49    100.00
```

Science Masters Degrees Offered

Table 349. Number and percent of institutions offering a masters degree in science, by institutions with various percents of currently enrolled students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF OFFM BY FACSKL1

OFFM      IS SCIENCE MASTERS OFFERED   FACSKL1   PERCENT FACULTY NO COMPUTER SKILLS

FREQUENCY|  Percent of Faculty with No Computer Training or Skills
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     22 |     26 |      7 |      3 |      2 |      1 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      4 |     21 |      2 |      6 |      3 |      2 |      1 |     35
         |      . |  23.08 |   2.20 |   6.59 |   3.30 |   2.20 |   1.10 |  38.46
         |      . |  60.00 |   5.71 |  17.14 |   8.57 |   5.71 |   2.86 |
         |      . |  37.50 |  20.00 |  54.55 |  50.00 |  40.00 |  33.33 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     46 |     35 |      8 |      5 |      3 |      3 |      2 |     56
         |      . |  38.46 |   8.79 |   5.49 |   3.30 |   3.30 |   2.20 |  61.54
         |      . |  62.50 |  14.29 |   8.93 |   5.36 |   5.36 |   3.57 |
         |      . |  62.50 |  80.00 |  45.45 |  50.00 |  60.00 |  66.67 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       56       10       11        6        5        3       91
                .    61.54    10.99    12.09     6.59     5.49     3.30   100.00
```

Science Masters Degrees Offered

Table 350. Number and percent of institutions offering a masters degree in science, by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF OFFM BY FACSKL2

OFFM      IS SCIENCE MASTERS OFFERED   FACSKL2   PERC FACULTY GENL AWARE OF COMPUTERS

FREQUENCY|  Percent of Faculty with General Awareness of Computers
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     22 |     14 |      6 |      8 |      3 |      7 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      4 |      4 |     12 |      9 |      8 |      2 |      0 |     35
         |      . |   4.40 |  13.19 |   9.89 |   8.79 |   2.20 |   0.00 |  38.46
         |      . |  11.43 |  34.29 |  25.71 |  22.86 |   5.71 |   0.00 |
         |      . |  19.05 |  54.55 |  37.50 |  50.00 |  28.57 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     46 |     17 |     10 |     15 |      8 |      5 |      1 |     56
         |      . |  18.68 |  10.99 |  16.48 |   8.79 |   5.49 |   1.10 |  61.54
         |      . |  30.36 |  17.86 |  26.79 |  14.29 |   8.93 |   1.79 |
         |      . |  80.95 |  45.45 |  62.50 |  50.00 |  71.43 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       21       22       24       16        7        1       91
                .    23.08    24.18    26.37    17.58     7.69     1.10   100.00
```

Science Masters Degrees Offered

Table 351. Number and percent of institutions offering a masters degree in science, by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                      TABLE OF OFFM BY FACSKL3

OFFM      IS SCIENCE MASTERS OFFERED   FACSKL3   PERC FACULTY LIMITED COMPUTER USE-SKILL

FREQUENCY|     Percent of Faculty with Limited Personal Computer Use and Skills
 PERCENT |
 ROW PCT |
 COL PCT |       .|        0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |     22 |     10 |     18 |      7 |      4 |      0 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      4 |      3 |     16 |     11 |      4 |      1 |      0 |     35
         |      . |   3.30 |  17.58 |  12.09 |   4.40 |   1.10 |   0.00 |  38.46
         |      . |   8.57 |  45.71 |  31.43 |  11.43 |   2.86 |   0.00 |
         |      . |  18.75 |  45.71 |  50.00 |  33.33 |  25.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     46 |     13 |     19 |     11 |      8 |      3 |      2 |     56
         |      . |  14.29 |  20.88 |  12.09 |   8.79 |   3.30 |   2.20 |  61.54
         |      . |  23.21 |  33.93 |  19.64 |  14.29 |   5.36 |   3.57 |
         |      . |  81.25 |  54.29 |  50.00 |  66.67 |  75.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       16       35       22       12        4        2       91
                .    17.58    38.46    24.18    13.19     4.40     2.20   100.00
```

Science Masters Degrees Offered

Table 352. Number and percent of institutions offering a masters degree in science, by institutions with various percents of faculty with limited personal computer use and skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF OFFM BY FACSKL4

OFFM      IS SCIENCE MASTERS OFFERED   FACSKL4   PERC FACULTY WHO CAN PROGRAM COMPUTER

FREQUENCY|          Percent of Faculty with Ability to Program a Computer
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     22 |      6 |     10 |      7 |      7 |      3 |      7 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      4 |      2 |     11 |     14 |      3 |      3 |      2 |     35
         |      . |   2.20 |  12.09 |  15.38 |   3.30 |   3.30 |   2.20 |  38.46
         |      . |   5.71 |  31.43 |  40.00 |   8.57 |   8.57 |   5.71 |
         |      . |  15.38 |  40.74 |  56.00 |  27.27 |  75.00 |  18.18 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     46 |     11 |     16 |     11 |      8 |      1 |      9 |     56
         |      . |  12.09 |  17.58 |  12.09 |   8.79 |   1.10 |   9.89 |  61.54
         |      . |  19.64 |  28.57 |  19.64 |  14.29 |   1.79 |  16.07 |
         |      . |  84.62 |  59.26 |  44.00 |  72.73 |  25.00 |  81.82 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       13       27       25       11        4       11       91
                .    14.29    29.67    27.47    12.09     4.40    12.09   100.00
```

Science Masters Degrees Offered

Table 353. Number and percent of institutions offering a masters degree in science, by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF OFFD BY NEWSKL1

OFFD      IS SCIENCE DOCTORATE OFFERED   NEWSKL1   PERC NEW STUD NO COMPUTER SKILLS

FREQUENCY|Percent of Newly Entering Students with No Computer Training or Skills
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     22 |      6 |      7 |      4 |      4 |      6 |     17 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      5 |      1 |      1 |      0 |      2 |      1 |      5 |     10
         |      . |   1.20 |   1.20 |   0.00 |   2.41 |   1.20 |   6.02 |  12.05
         |      . |  10.00 |  10.00 |   0.00 |  20.00 |  10.00 |  50.00 |
         |      . |   9.09 |   7.14 |   0.00 |  40.00 |   8.33 |  14.71 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     49 |     10 |     13 |      7 |      3 |     11 |     29 |     73
         |      . |  12.05 |  15.66 |   8.43 |   3.61 |  13.25 |  34.94 |  87.95
         |      . |  13.70 |  17.81 |   9.59 |   4.11 |  15.07 |  39.73 |
         |      . |  90.91 |  92.86 | 100.00 |  60.00 |  91.67 |  85.29 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       11       14        7        5       12       34       83
                .    13.25    16.87     8.43     6.02    14.46    40.96   100.00
```

Science Doctorate Degrees Offered

Table 354. Number and percent of institutions offering a doctorate degree in science, by institutions with various percents of newly entering students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF OFFD BY NEWSKL2

OFFD      IS SCIENCE DOCTORATE OFFERED   NEWSKL2   PERC NEW STUD GENL AWARE OF COMPUTERS

FREQUENCY|  Percent of Newly Entering Students with General Awareness of Computers
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     22 |      9 |     16 |      3 |      5 |      5 |      6 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      5 |      2 |      6 |      0 |      2 |      0 |      0 |     10
         |      . |   2.41 |   7.23 |   0.00 |   2.41 |   0.00 |   0.00 |  12.05
         |      . |  20.00 |  60.00 |   0.00 |  20.00 |   0.00 |   0.00 |
         |      . |  11.76 |  20.00 |   0.00 |  25.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     49 |     15 |     24 |      9 |      6 |      5 |     14 |     73
         |      . |  18.07 |  28.92 |  10.84 |   7.23 |   6.02 |  16.87 |  87.95
         |      . |  20.55 |  32.88 |  12.33 |   8.22 |   6.85 |  19.18 |
         |      . |  88.24 |  80.00 | 100.00 |  75.00 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       17       30        9        8        5       14       83
                .    20.48    36.14    10.84     9.64     6.02    16.87   100.00
```

Science Doctorate Degrees Offered

Table 355. Number and percent of institutions offering a doctorate degree in science, by institutions with various percents of newly entering students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF OFFD BY NEWSKL3

OFFD      IS SCIENCE DOCTORATE OFFERED     NEWSKL3    PERC NEW

FREQUENCY|  Percent of Newly Entering Students with Limited
PERCENT  |            Personal Computer Use and Skill
ROW PCT  |
COL PCT  |       .|       0|1%-20% |21%-40% |  TOTAL
---------+--------+--------+--------+--------+
 .       |     22 |     20 |     21 |      3 |      .
         |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |
         |      . |      . |      . |      . |
---------+--------+--------+--------+--------+
YES      |      5 |      4 |      5 |      1 |     10
         |      . |   4.82 |   6.02 |   1.20 |  12.05
         |      . |  40.00 |  50.00 |  10.00 |
         |      . |  12.12 |  11.90 |  12.50 |
---------+--------+--------+--------+--------+
NO       |     49 |     29 |     37 |      7 |     73
         |      . |  34.94 |  44.58 |   8.43 |  87.95
         |      . |  39.73 |  50.68 |   9.59 |
         |      . |  87.88 |  88.10 |  87.50 |
---------+--------+--------+--------+--------+
TOTAL           .       33       42        8       83
                .    39.76    50.60     9.64   100.00
```

Science Doctorate Degrees Offered

Table 356. Number and percent of institutions offering a doctorate degree in science, by institutions with various percents of newly entering students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Science Doctorate Degrees Offered

```
                          TABLE OF OFFD BY NEWSKL4

OFFD      IS SCIENCE DOCTORATE OFFERED   NEWSKL4   PERC NEW STUD WHO C

FREQUENCY| Percent of Newly Entering Students with Ability to Program a Computer
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |81%-100%|  TOTA
---------+--------+--------+--------+--------+--------+--------+
   .     |     22 |     28 |     15 |      0 |      1 |      0 |
         |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+
YES      |      5 |      4 |      5 |      0 |      0 |      1 |     1
         |      . |   4.82 |   6.02 |   0.00 |      . |   1.20 |  12.
         |      . |  40.00 |  50.00 |   0.00 |      . |  10.00 |
         |      . |   8.70 |  14.71 |   0.00 |      . | 100.00 |
---------+--------+--------+--------+--------+--------+--------+
NO       |     49 |     42 |     29 |      2 |      0 |      0 |     7
         |      . |  50.60 |  34.94 |   2.41 |      . |   0.00 |  87.
         |      . |  57.53 |  39.73 |   2.74 |      . |   0.00 |
         |      . |  91.30 |  85.29 | 100.00 |      . |   0.00 |
---------+--------+--------+--------+--------+--------+--------+
TOTAL           .       46       34        2        .        1      8
                .    55.42    40.96     2.41        .     1.20  100.
```

Table 357 . Number and percent of institutions offering a doctorate degree in science, by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                    S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                  21:39 WEDNESDAY, SEPTEMBER

                              TABLE OF OFFD BY OLDSKL1

OFFD        IS SCIENCE DOCTORATE OFFERED    OLDSKL1   PERC CURRENT STUD NO COMPUTER SKILLS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     22 |     12 |     11 |      6 |      3 |      5 |      7 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      4 |      1 |      4 |      3 |      0 |      2 |      1 |     11
         |      . |   1.18 |   4.71 |   3.53 |   0.00 |   2.35 |   1.18 |  12.94
         |      . |   9.09 |  36.36 |  27.27 |   0.00 |  18.18 |   9.09 |
         |      . |   4.55 |  25.00 |  20.00 |   0.00 |  20.00 |   7.69 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     48 |     21 |     12 |     12 |      9 |      8 |     12 |     74
         |      . |  24.71 |  14.12 |  14.12 |  10.59 |   9.41 |  14.12 |  87.06
         |      . |  28.38 |  16.22 |  16.22 |  12.16 |  10.81 |  16.22 |
         |      . |  95.45 |  75.00 |  80.00 | 100.00 |  80.00 |  92.31 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       22       16       15        9       10       13       85
                .    25.88    18.82    17.65    10.59    11.76    15.29   100.00
```

Percent of Currently Enrolled Students with No Computer Training or Skills

Science Doctorate Degrees Offered

Table 358. Number and percent of institutions offering a doctorate degree in science, by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Science Doctorate Degrees Offered

Percent of Currently Enrolled Students with General Awareness of Computers

```
                          TABLE OF OFFD BY OLDSKL2

OFFD      IS SCIENCE DOCTORATE OFFERED   OLDSKL2   PERC CURRENT STUD GENL AWARE COMPUTERS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     22 |      8 |     20 |      5 |      7 |      3 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      4 |      1 |      4 |      2 |      4 |      0 |      0 |     11
         |      . |   1.18 |   4.71 |   2.35 |   4.71 |   0.00 |   0.00 |  12.94
         |      . |   9.09 |  36.36 |  18.18 |  36.36 |   0.00 |   0.00 |
         |      . |   6.25 |  14.81 |   8.70 |  57.14 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     48 |     15 |     23 |     21 |      3 |      8 |      4 |     74
         |      . |  17.65 |  27.06 |  24.71 |   3.53 |   9.41 |   4.71 |  87.06
         |      . |  20.27 |  31.08 |  28.38 |   4.05 |  10.81 |   5.41 |
         |      . |  93.75 |  85.19 |  91.30 |  42.86 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       16       27       23        7        8        4       85
                .    18.82    31.76    27.06     8.24     9.41     4.71   100.00
```

Table 359. Number and percent of institutions offering a doctorate degree in science, by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                          TABLE OF OFFD BY OLDSKL3

OFFD      IS SCIENCE DOCTORATE OFFERED   OLDSKL3   PERC CURRENT STUD LIMITED COMPUTER USE

FREQUENCY|  Percent of Currently Enrolled Students with Limited Personal Computer Use
PERCENT  |                                 and Skills
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     22 |     10 |     25 |      4 |      2 |      1 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      4 |      1 |      9 |      1 |      0 |      0 |      0 |     11
         |      . |   1,18 |  10,59 |   1,18 |   0,00 |      . |   0,00 |  12,94
         |      . |   9,09 |  81,82 |   9,09 |   0,00 |      . |   0,00 |
         |      . |   6,25 |  19,15 |   7,69 |   0,00 |      . |   0,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     48 |     15 |     38 |     12 |      7 |      0 |      2 |     74
         |      . |  17,65 |  44,71 |  14,12 |   8,24 |      . |   2,35 |  87,06
         |      . |  20,27 |  51,35 |  16,22 |   9,46 |      . |   2,70 |
         |      . |  93,75 |  80,85 |  92,31 | 100,00 |      . | 100,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       16       47       13        7        .        2       85
        .       .    18,82    55,29    15,29     8,24        .     2,35   100,00
```

Science Doctorate Degrees Offered

Table 360. Number and percent of institutions offering a doctorate degree in science, by institutions with various percents of currently enrolled students with limited personal computer use and skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                    S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                      21:39 WEDNESDAY, SEPTEMBER

                              TABLE OF OFFD BY OLDSKL4

     OFFD       IS SCIENCE DOCTORATE OFFERED   OLDSKL4   PERC CURRENT STUD WHO CAN PROGRAM COMP

     FREQUENCY|  Percent of Currently Enrolled Students with Ability to Program a Computer
      PERCENT |
      ROW PCT |
      COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
     ---------+--------+--------+--------+--------+--------+--------+--------+
      .       |     22 |     12 |     17 |      6 |      5 |      3 |      1 |      .
              |      . |      . |      . |      . |      . |      . |      . |      .
              |      . |      . |      . |      . |      . |      . |      . |
              |      . |      . |      . |      . |      . |      . |      . |
     ---------+--------+--------+--------+--------+--------+--------+--------+
     YES      |      4 |      0 |      8 |      1 |      0 |      1 |      1 |     11
              |      . |   0.00 |   9.41 |   1.18 |   0.00 |   1.18 |   1.18 |  12.94
              |      . |   0.00 |  72.73 |   9.09 |   0.00 |   9.09 |   9.09 |
              |      . |   0.00 |  19.51 |  10.00 |   0.00 |  50.00 |  25.00 |
     ---------+--------+--------+--------+--------+--------+--------+--------+
     NO       |     48 |     22 |     33 |      9 |      6 |      1 |      3 |     74
              |      . |  25.88 |  38.82 |  10.59 |   7.06 |   1.18 |   3.53 |  87.06
              |      . |  29.73 |  44.59 |  12.16 |   8.11 |   1.35 |   4.05 |
              |      . | 100.00 |  80.49 |  90.00 | 100.00 |  50.00 |  75.00 |
     ---------+--------+--------+--------+--------+--------+--------+--------+
     TOTAL           .       22       41       10        6        2        4       85
                     .    25.88    48.24    11.76     7.06     2.35     4.71   100.00
```

Science Doctorate Degrees Offered

Table 361. Number and percent of institutions offering a doctorate degree in science, by institutions with various percents of currently enrolled students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                   S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                     21:39 WEDNESDAY, SEPTEMBER

                                    TABLE OF OFFD BY FACSKL1

OFFD      IS SCIENCE DOCTORATE OFFERED   FACSKL1   PERCENT FACULTY NO COMPUTER SKILLS

FREQUENCY|  Percent of Faculty with No Computer Training or Skills
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     22 |     30 |      7 |      3 |      2 |      1 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      4 |      6 |      0 |      2 |      1 |      2 |      0 |     11
         |      . |   6.90 |   0.00 |   2.30 |   1.15 |   2.30 |   0.00 |  12.64
         |      . |  54.55 |   0.00 |  18.18 |   9.09 |  18.18 |   0.00 |
         |      . |  11.54 |   0.00 |  18.18 |  16.67 |  40.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     46 |     46 |     10 |      9 |      5 |      3 |      3 |     76
         |      . |  52.87 |  11.49 |  10.34 |   5.75 |   3.45 |   3.45 |  87.36
         |      . |  60.53 |  13.16 |  11.84 |   6.58 |   3.95 |   3.95 |
         |      . |  88.46 | 100.00 |  81.82 |  83.33 |  60.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       52       10       11        6        5        3       87
                .    59.77    11.49    12.64     6.90     5.75     3.45   100.00
```

Science Doctorate Degrees Offered

Table 362 . Number and percent of institutions offering a doctorate degree in science, by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Faculty with General Awareness of Computers

Science Doctorate Degrees Offered

```
                 STATISTICAL ANALYSIS SYSTEM                       21:39 WEDNESDAY, SEPTEMBER

                                TABLE OF OFFD BY FACSKL2

OFFD      IS SCIENCE DOCTORATE OFFERED   FACSKL2   PERC FACULTY GENL AWARE OF COMPUTERS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |     22 |     14 |      8 |      9 |      4 |      7 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      4 |      0 |      5 |      2 |      3 |      1 |      0 |     11
         |      . |   0.00 |   5.75 |   2.30 |   3.45 |   1.15 |   0.00 |  12.64
         |      . |   0.00 |  45.45 |  18.18 |  27.27 |   9.09 |   0.00 |
         |      . |   0.00 |  25.00 |   8.70 |  20.00 |  14.29 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     46 |     21 |     15 |     21 |     12 |      6 |      1 |     76
         |      . |  24.14 |  17.24 |  24.14 |  13.79 |   6.90 |   1.15 |  87.36
         |      . |  27.63 |  19.74 |  27.63 |  15.79 |   7.89 |   1.32 |
         |      . | 100.00 |  75.00 |  91.30 |  80.00 |  85.71 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       21       20       23       15        7        1       87
                .    24.14    22.99    26.44    17.24     8.05     1.15   100.00
```

Table 363. Number and percent of institutions offering a doctorate degree in science, by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF OFFD BY FACSKL3

OFFD      IS SCIENCE DOCTORATE OFFERED   FACSKL3   PERC FACULTY LIMITED COMPUTER USE-SKILL

FREQUENCY|  Percent of Faculty with Limited Personal Computer Use and Skills
 PERCENT |
 ROW PCT |
 COL PCT |      .|      0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+-------+-------+--------+--------+--------+--------+--------+
   .     |    22 |    10 |     20 |      8 |      4 |      1 |      1 |     .
         |     . |     . |      . |      . |      . |      . |      . |     .
         |     . |     . |      . |      . |      . |      . |      . |
         |     . |     . |      . |      . |      . |      . |      . |
---------+-------+-------+--------+--------+--------+--------+--------+
YES      |     4 |     2 |      5 |      3 |      1 |      0 |      0 |    11
         |     . |  2.30 |   5.75 |   3.45 |   1.15 |   0.00 |   0.00 | 12.64
         |     . | 18.18 |  45.45 |  27.27 |   9.09 |   0.00 |   0.00 |
         |     . | 12.50 |  15.15 |  14.29 |   8.33 |   0.00 |   0.00 |
---------+-------+-------+--------+--------+--------+--------+--------+
NO       |    46 |    14 |     28 |     18 |     11 |      3 |      2 |    76
         |     . | 16.09 |  32.18 |  20.69 |  12.64 |   3.45 |   2.30 | 87.36
         |     . | 18.42 |  36.84 |  23.68 |  14.47 |   3.95 |   2.63 |
         |     . | 87.50 |  84.85 |  85.71 |  91.67 | 100.00 | 100.00 |
---------+-------+-------+--------+--------+--------+--------+--------+
TOTAL          .      16       33       21       12        3        2       87
               .   18.39    37.93    24.14    13.79     3.45     2.30   100.00
```

Science Doctorate Degrees Offered

Table 364. Number and percent of institutions offering a doctorate degree in science, by institutions with various percents of faculty with limited personal computer use and skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

656

655

```
                       TABLE OF OFFD BY FACSKL4

OFFD      IS SCIENCE DOCTORATE OFFERED   FACSKL4   PERC FACULTY WHO CAN PROGRAM COMPUTER

FREQUENCY|
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |     22 |      6 |     11 |      9 |      7 |      4 |      7 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      4 |      0 |      4 |      6 |      0 |      0 |      1 |     11
         |      . |   0.00 |   4.60 |   6.90 |   0.00 |   0.00 |   1.15 |  12.64
         |      . |   0.00 |  36.36 |  54.55 |   0.00 |   0.00 |   9.09 |
         |      . |   0.00 |  15.38 |  26.09 |   0.00 |   0.00 |   9.09 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     46 |     13 |     22 |     17 |     11 |      3 |     10 |     76
         |      . |  14.94 |  25.29 |  19.54 |  12.64 |   3.45 |  11.49 |  87.36
         |      . |  17.11 |  28.95 |  22.37 |  14.47 |   3.95 |  13.16 |
         |      . | 100.00 |  84.62 |  73.91 | 100.00 | 100.00 |  90.91 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       13       26       23       11        3       11       87
                .    14.94    29.89    26.44    12.64     3.45    12.64   100.00
```

Percent of Faculty with Ability to Program a Computer

Science Doctorate Degrees Offered

Table 365. Number and percent of institutions offering a doctorate degree in science, by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                          TABLE OF MINOR BY NEWSKL1

MINOR     IS SCIENCE MINOR OFFERED   NEWSKL1   PERC NEW STUD NO COMPUTER SKILLS
```

Percent of Newly Entering Students with No Computer Training or Skills

Science Minor Offered

```
FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     21 |      6 |      7 |      3 |      3 |      5 |     15 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     28 |      7 |      9 |      5 |      3 |      8 |     23 |     55
         |      . |   7.95 |  10.23 |   5.68 |   3.41 |   9.09 |  26.14 |  62.50
         |      . |  12.73 |  16.36 |   9.09 |   5.45 |  14.55 |  41.82 |
         |      . |  63.64 |  64.29 |  62.50 |  50.00 |  61.54 |  63.89 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     27 |      4 |      5 |      3 |      3 |      5 |     13 |     33
         |      . |   4.55 |   5.68 |   3.41 |   3.41 |   5.68 |  14.77 |  37.50
         |      . |  12.12 |  15.15 |   9.09 |   9.09 |  15.15 |  39.39 |
         |      . |  36.36 |  35.71 |  37.50 |  50.00 |  38.46 |  36.11 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       11       14        8        6       13       36       88
                .    12.50    15.91     9.09     6.82    14.77    40.91   100.00
```

Table 366. Number and percent of institutions offering a minor in science, by institutions with various percents of newly entering students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                          TABLE OF MINOR BY NEWSKL2

MINOR      IS SCIENCE MINOR OFFERED   NEWSKL2   PERC NEW STUD GENL AWARE OF COMPUTERS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     21 |      9 |     13 |      3 |      4 |      4 |      6 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     28 |     13 |     19 |      7 |      6 |      3 |      7 |     55
         |      . |  14.77 |  21.59 |   7.95 |   6.82 |   3.41 |   7.95 |  62.50
         |      . |  23.64 |  34.55 |  12.73 |  10.91 |   5.45 |  12.73 |
         |      . |  76.47 |  57.58 |  77.78 |  66.67 |  50.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     27 |      4 |     14 |      2 |      3 |      3 |      7 |     33
         |      . |   4.55 |  15.91 |   2.27 |   3.41 |   3.41 |   7.95 |  37.50
         |      . |  12.12 |  42.42 |   6.06 |   9.09 |   9.09 |  21.21 |
         |      . |  23.53 |  42.42 |  22.22 |  33.33 |  50.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       17       33        9        9        6       14       88
                .    19.32    37.50    10.23    10.23     6.82    15.91   100.00
```

Percent of Newly Entering Students with General Awareness of Computers

Science Minor Offered

Table 367. Number and percent of institutions offering a minor in science, by institutions with various percents of newly entering students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF MINOR BY NEWSKL3

MINOR      IS SCIENCE MINOR OFFERED   NEWSKL3   PERC NEW STUD LIMITED COMPUTER USE-SK

FREQUENCY| Percent of Newly Entering Students with Limited
 PERCENT |     Personal Computer Use or Skill
 ROW PCT |
 COL PCT |         .|        0|1%-20%  |21%-40% |  TOTAL
---------+---------+---------+---------+---------+
    .    |      21 |      17 |      19 |       3 |      .
         |       . |       . |       . |       . |      .
         |       . |       . |       . |       . |
         |       . |       . |       . |       . |
---------+---------+---------+---------+---------+
YES      |      28 |      24 |      25 |       6 |     55
         |       . |   27.27 |   28.41 |    6.82 |  62.50
         |       . |   43.64 |   45.45 |   10.91 |
         |       . |   66.67 |   56.82 |   75.00 |
---------+---------+---------+---------+---------+
NO       |      27 |      12 |      19 |       2 |     33
         |       . |   13.64 |   21.59 |    2.27 |  37.50
         |       . |   36.36 |   57.58 |    6.06 |
         |       . |   33.33 |   43.18 |   25.00 |
---------+---------+---------+---------+---------+
TOTAL            .        36        44         8       88
                 .     40.91     50.00      9.09   100.00
```

Science Minor Offered

Table 368. Number and percent of institutions offering a minor in science, by institutions with various percents of newly entering students with limited personal computer use or skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF MINOR BY NEWSKL4

MINOR     IS SCIENCE MINOR OFFERED   NEWSKL4   PERC NEW STUD WHO CAN PROGRAM COMPUTER

FREQUENCY|  Percent of Newly Entering Students with Ability to Program a Computer
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+
   .     |     21 |     26 |     12 |      0 |      1 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+
YES      |     28 |     32 |     20 |      2 |      0 |      1 |     55
         |      . |  36.36 |  22.73 |   2.27 |      . |   1.14 |  62.50
         |      . |  58.18 |  36.36 |   3.64 |      . |   1.82 |
         |      . |  66.67 |  54.05 | 100.00 |      . | 100.00 |
---------+--------+--------+--------+--------+--------+--------+
NO       |     27 |     16 |     17 |      0 |      0 |      0 |     33
         |      . |  18.18 |  19.32 |   0.00 |      . |   0.00 |  37.50
         |      . |  48.48 |  51.52 |   0.00 |      . |   0.00 |
         |      . |  33.33 |  45.95 |   0.00 |      . |   0.00 |
---------+--------+--------+--------+--------+--------+--------+
TOTAL           .       48       37        2        .        1       88
                .    54.55    42.05     2.27        .     1.14   100.00
```

Science Minor Offered

Table 369. Number and percent of institutions offering a minor in science, by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF MINOR BY OLDSKL1

MINOR     IS SCIENCE MINOR OFFERED   OLDSKL1   PERC CURRENT STUD NO COMPUTER SKILLS

FREQUENCY|  Percent of Currently Enrolled Students with No Computer Training or Skills
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     21 |     11 |     11 |      4 |      2 |      5 |      6 |     .
         |      . |      . |      . |      . |      . |      . |      . |     .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     27 |     13 |     12 |     12 |      6 |      6 |      7 |     56
         |      . |  14.44 |  13.33 |  13.33 |   6.67 |   6.67 |   7.78 |  62.22
         |      . |  23.21 |  21.43 |  21.43 |  10.71 |  10.71 |  12.50 |
         |      . |  56.52 |  75.00 |  70.59 |  60.00 |  60.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     26 |     10 |      4 |      5 |      4 |      4 |      7 |     34
         |      . |  11.11 |   4.44 |   5.56 |   4.44 |   4.44 |   7.78 |  37.78
         |      . |  29.41 |  11.76 |  14.71 |  11.76 |  11.76 |  20.59 |
         |      . |  43.48 |  25.00 |  29.41 |  40.00 |  40.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       23       16       17       10       10       14       90
                .    25.56    17.78    18.89    11.11    11.11    15.56   100.00
```

Science Minor Offered

Table 370. Number and percent of institutions offering a minor in science, by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF MINOR BY OLDSKL2

MINOR     IS SCIENCE MINOR CFFERED    OLDSKL2    PERC CURRENT STUD GENL AWARE COMPUTERS

FREQUENCY|  Percent of Currently Enrolled Students with General Awareness of Computers
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     21 |      8 |     17 |      5 |      5 |      3 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     27 |     11 |     18 |     17 |      6 |      2 |      2 |     56
         |      . |  12.22 |  20.00 |  18.89 |   6.67 |   2.22 |   2.22 |  62.22
         |      . |  19.64 |  32.14 |  30.36 |  10.71 |   3.57 |   3.57 |
         |      . |  68.75 |  60.00 |  73.91 |  66.67 |  25.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     26 |      5 |     12 |      6 |      3 |      6 |      2 |     34
         |      . |   5.56 |  13.33 |   6.67 |   3.33 |   6.67 |   2.22 |  37.78
         |      . |  14.71 |  35.29 |  17.65 |   8.82 |  17.65 |   5.88 |
         |      . |  31.25 |  40.00 |  26.09 |  33.33 |  75.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       16       30       23        9        8        4       90
                .    17.78    33.33    25.56    10.00     8.89     4.44   100.00
```

Science Minor Offered

Table 371. Number and percent of institutions offering a minor in science, by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                          TABLE OF MINOR BY OLDSKL3

MINOR      IS SCIENCE MINOR OFFERED    OLDSKL3    PERC CURRENT STUD LIMITED COMPUTER USE

FREQUENCY| Percent of Currently Enrolled Students with Limited Personal Computer Use
 PERCENT |                              and Skills
 ROW PCT |
 COL PCT |       .|        0|1%-20%  |21%-40%  |41%-60%  |61%-80%  |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     21 |      9 |     21 |      4 |      2 |      1 |      2 |       .
         |      . |      . |      . |      . |      . |      . |      . |       .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     27 |      8 |     29 |     10 |      7 |      0 |      2 |      56
         |      . |   8.89 |  32.22 |  11.11 |   7.78 |      . |   2.22 |   62.22
         |      . |  14.29 |  51.79 |  17.86 |  12.50 |      . |   3.57 |
         |      . |  47.06 |  56.86 |  76.92 | 100.00 |      . | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     26 |      9 |     22 |      3 |      0 |      0 |      0 |      34
         |      . |  10.00 |  24.44 |   3.33 |   0.00 |      . |   0.00 |   37.78
         |      . |  26.47 |  64.71 |   8.82 |   0.00 |      . |   0.00 |
         |      . |  52.94 |  43.14 |  23.08 |   0.00 |      . |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       17       51       13        7        .        2       90
                .    18.89    56.67    14.44     7.78        .     2.22   100.00
```

Science Minor Offered

Table 372. Number and percent of institutions offering a minor in science, by institutions with various percents of currently enrolled students with limited personal computer use and skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
               S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                          21:39 WEDNESDAY, SEPTEMBE

                         TABLE OF MINOR BY OLDSKL4

MINOR     IS SCIENCE MINOR OFFERED    OLDSKL4   PERC CURRENT STUD WHO CAN PROGRAM COMP

FREQUENCY|  Percent of Currently Enrolled Students with Ability to Program a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|        0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
 .     . |      21 |     11 |     14 |      6 |      5 |      2 |      1 |      .
         |       . |      . |      . |      . |      . |      . |      . |      .
         |       . |      . |      . |      . |      . |      . |      . |
         |       . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      27 |     14 |     27 |      7 |      4 |      1 |      3 |     56
         |       . |  15.56 |  30.00 |   7.78 |   4.44 |   1.11 |   3.33 |  62.22
         |       . |  25.00 |  48.21 |  12.50 |   7.14 |   1.79 |   5.36 |
         |       . |  60.87 |  61.36 |  70.00 |  66.67 |  33.33 |  75.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |      26 |      9 |     17 |      3 |      2 |      2 |      1 |     34
         |       . |  10.00 |  18.89 |   3.33 |   2.22 |   2.22 |   1.11 |  37.78
         |       . |  26.47 |  50.00 |   8.82 |   5.88 |   5.88 |   2.94 |
         |       . |  39.13 |  38.64 |  30.00 |  33.33 |  66.67 |  25.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL            .       23       44       10        6        3        4       90
                 .    25.56    48.89    11.11     6.67     3.33     4.44   100.00
```

Science Minor Offered

Table 373. Number and percent of institutions offering a minor in science, by institutions with various percents of currently enrolled students with ability to program a a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

674

673

```
                         TABLE OF MINOR BY FACSKL1

MINOR     IS SCIENCE MINOR OFFERED    FACSKL1   PERCENT FACULTY NO COMPUTER SKILLS

FREQUENCY|     Percent of Faculty with No Computer Training or Skills
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
.        |     20 |     27 |      6 |      4 |      2 |      1 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     27 |     31 |      7 |      8 |      4 |      4 |      2 |     56
         |      . |  34.07 |   7.69 |   8.79 |   4.40 |   4.40 |   2.20 |  61.54
         |      . |  55.36 |  12.50 |  14.29 |   7.14 |   7.14 |   3.57 |
         |      . |  56.36 |  63.64 |  80.00 |  66.67 |  80.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     25 |     24 |      4 |      2 |      2 |      1 |      2 |     35
         |      . |  26.37 |   4.40 |   2.20 |   2.20 |   1.10 |   2.20 |  38.46
         |      . |  68.57 |  11.43 |   5.71 |   5.71 |   2.86 |   5.71 |
         |      . |  43.64 |  36.36 |  20.00 |  33.33 |  20.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       55       11       10        6        5        4       91
                .    60.44    12.09    10.99     6.59     5.49     4.40   100.00
```

Science Minor Offered

Table 374. Number and percent of institutions offering a minor in science, by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF MINOR BY FACSKL2

MINOR     IS SCIENCE MINOR OFFERED   FACSKL2   PERC FACULTY GENL AWARE OF COMPUTERS

FREQUENCY|      Percent of Faculty with General Awareness of Computers
PERCENT  |
ROW PCT  |
COL PCT  |      .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+-------+--------+--------+--------+--------+--------+--------+
   .     |     20|      13|       6|       9|       4|       6|       2|      .
         |      .|       .|       .|       .|       .|       .|       .|      .
         |      .|       .|       .|       .|       .|       .|       .|
         |      .|       .|       .|       .|       .|       .|       .|
---------+-------+--------+--------+--------+--------+--------+--------+
YES      |     27|       9|      17|      15|      10|       4|       1|     56
         |      .|    9.89|   18.68|   16.48|   10.99|    4.40|    1.10|  61.54
         |      .|   16.07|   30.36|   26.79|   17.86|    7.14|    1.79|
         |      .|   40.91|   77.27|   65.22|   66.67|   50.00|  100.00|
---------+-------+--------+--------+--------+--------+--------+--------+
NO       |     25|      13|       5|       8|       5|       4|       0|     35
         |      .|   14.29|    5.49|    8.79|    5.49|    4.40|    0.00|  38.46
         |      .|   37.14|   14.29|   22.86|   14.29|   11.43|    0.00|
         |      .|   59.09|   22.73|   34.78|   33.33|   50.00|    0.00|
---------+-------+--------+--------+--------+--------+--------+--------+
TOTAL           .       22       22       23       15        8        1      91
                .    24.18    24.18    25.27    16.48     8.79     1.10  100.00
```

Science Minor Offered

Table 375. Number and percent of institutions offering a minor in science, by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF MINOR BY FACSKL3

MINOR     IS SCIENCE MINOR OFFERED   FACSKL3   PERC FACULTY LIMITED COMPUTER USE-SKILL

FREQUENCY|  Percent of Faculty with Limited Personal Computer Use and Skills
 PERCENT |
 ROW PCT |
 COL PCT |        .|        0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+---------+---------+--------+--------+--------+--------+--------+
   .     |      29 |       8 |     19 |      7 |      4 |      1 |      1 |      .
         |       . |       . |      . |      . |      . |      . |      . |      .
         |       . |       . |      . |      . |      . |      . |      . |
         |       . |       . |      . |      . |      . |      . |      . |
---------+---------+---------+--------+--------+--------+--------+--------+
YES      |      27 |       5 |     24 |     15 |      8 |      3 |      1 |     56
         |       . |    5.49 |  26.37 |  16.48 |   8.79 |   3.30 |   1.10 |  61.54
         |       . |    8.93 |  42.86 |  26.79 |  14.29 |   5.36 |   1.79 |
         |       . |   27.78 |  70.59 |  68.18 |  66.67 | 100.00 |  50.00 |
---------+---------+---------+--------+--------+--------+--------+--------+
NO       |      25 |      13 |     10 |      7 |      4 |      0 |      1 |     35
         |       . |   14.29 |  10.99 |   7.69 |   4.40 |   0.00 |   1.10 |  38.46
         |       . |   37.14 |  28.57 |  20.00 |  11.43 |   0.00 |   2.86 |
         |       . |   72.22 |  29.41 |  31.82 |  33.33 |   0.00 |  50.00 |
---------+---------+---------+--------+--------+--------+--------+--------+
TOTAL            .        18       34       22       12        3        2       91
                 .     19.78    37.36    24.18    13.19     3.30     2.20   100.00
```

Science Minor Offered

Table 376. Number and percent of institutions offering a minor in science, by institutions with various percents of faculty with limited personal computer use and skills, by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
          S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                              21:39 WEDNESDAY, SEPTEMB

                           TABLE OF MINOR BY FACSKL4

    MINOR     IS SCIENCE MINOR OFFERED   FACSKL4   PERC FACULTY WHO CAN PROGRAM COMPUTER

    FREQUENCY|
     PERCENT |
     ROW PCT |
     COL PCT |       .|      0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
    ---------+--------+-------+--------+--------+--------+--------+--------+
        .    |     20 |     6 |     10 |      8 |      6 |      4 |      6 |      .
             |      . |     . |      . |      . |      . |      . |      . |      .
             |      . |     . |      . |      . |      . |      . |      . |
             |      . |     . |      . |      . |      . |      . |      . |
    ---------+--------+-------+--------+--------+--------+--------+--------+
    YES      |     27 |     9 |     19 |     16 |      5 |      3 |      4 |     56
             |      . |  9.89 |  20.88 |  17.58 |   5.49 |   3.30 |   4.40 |  61.54
             |      . | 16.07 |  33.93 |  28.57 |   8.93 |   5.36 |   7.14 |
             |      . | 69.23 |  70.37 |  66.67 |  41.67 | 100.00 |  33.33 |
    ---------+--------+-------+--------+--------+--------+--------+--------+
    NO       |     25 |     4 |      8 |      8 |      7 |      0 |      8 |     35
             |      . |  4.40 |   8.79 |   8.79 |   7.69 |   0.00 |   8.79 |  38.46
             |      . | 11.43 |  22.86 |  22.86 |  20.00 |   0.00 |  22.86 |
             |      . | 30.77 |  29.63 |  33.33 |  58.33 |   0.00 |  66.67 |
    ---------+--------+-------+--------+--------+--------+--------+--------+
    TOTAL           .      13       27       24       12        3       12       91
                    .   14.29    29.67    26.37    13.19     3.30    13.19   100.00
```

Percent of Faculty with Ability to Program a Computer

Science Minor Offered

Table 377. Number and percent of institutions offering a minor in science, by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

are summarized in Figure 6, and are illustrated in greater detail in Tables 378 through 397.

It appears that the percentage of science faculty reported to use computers for administrative purposes in conjunction with their classes tends to be slightly lower in minority institutions that award associate degrees in science, to be slightly lower in institutions that award bachelors degrees in science, to be inconsistently related to whether or not a minority institution awards masters degrees or doctoral degrees in science, and to be unrelated to whether or not an institution offers an academic minor in science.

The percentage of science faculty reported to use computers for instructional purposes in their classes is apparently unrelated to whether or not a minority institution awards associate or bachelors degrees in science, to be slightly higher in institutions that award masters degrees in science, to be inconsistently related to whether or not an institution awards doctoral degrees in science, and to be slightly higher in institutions that offer an academic minor in science.

Science faculty tend to use computers in conjunction with their research in slightly lower percentages in institutions that award associate degrees in the sciences, in moderately higher percentages in institutions that award either bachelors degrees or masters degrees in the sciences, and in slightly higher percentages in institutions that award doctoral degrees in the sciences or offer an academic minor in the sciences.

Finally, the percentage of science faculty reported to use computers in conjunction with independent experimentation and games appears to be slightly higher in institutions that award an associate degree in the sciences, to be somewhat lower in institutions that award a bachelors degree in the sciences, to be slightly lower in institutions that award either masters degrees or

Degrees Offered	Purpose of Computer Use by Faculty in Sciences			
	Administrative	Instructional	Research	Games-Experimental
Science Associate Degree	Table 378. Slight negative relationship. Contingency coeff. = 0.23	Table 379. No relationship. Contingency coeff. = 0.16	Table 380. Very slight negative relationship. Contingency coeff. = 0.20	Table 381. Very slight positive relationship. Contingency coeff. = 0.30
Science Bachelors Degree	Table 382. Slight negative relationship. Contingency coeff. = 0.36	Table 383. No relationship. Contingency coeff. = 0.18	Table 384. Moderate positive relationship. Contingency coeff. = 0.31	Table 385. Modest negative relationship. Contingency coeff. = 0.33
Science Masters Degree	Table 386. No consistent relationship. Contingency coeff. = 0.36	Table 387. Slight positive relationship. Contingency coeff. = 0.33	Table 388. Modest positive relationship. Contingency coeff. = 0.30	Table 389. Slight negative relationship Contingency coeff. = 0.23
Science Doctoral Degree	Table 390. No consistent relationship. Contingency coeff. = 0.23	Table 391. No consistent relationship. Contingency coeff. = 0.36	Table 392. Slight positive relationship. Contingency coeff. = 0.33	Table 393. Slight negative relationship Contingency coeff. = 0.18
Minor in Science	Table 394. No relationship. Contingency coeff. = 0.21	Table 395. Slight positive relationship. Contingency coeff. = 0.30	Table 396. Slight positive relationship. Contingency coeff. = 0.27	Table 397. No consistent relationship Contingency coeff. = 0.24

Figure 6. Summary of relationships between the degree offerings of minority higher education institutions and the extensiveness of computer use for various purposes by faculty in science departments, as reported by 83 academic vice presidents and 178 heads of science departments.

```
               S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                  21:39 WEDNESDAY, SEPTEMBE

                                  TABLE OF OFFA BY FACADM

      OFFA     IS SCIENCE ASSOCIATE DEGREE OFFERED   FACADM    PERC FACULTY USE FOR ADMIN OF CLASSES

      FREQUENCY| Percent of Faculty Having Access to Computers for Administrative Purposes
       PERCENT |
       ROW PCT |
       COL PCT |      .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
      ---------+--------+--------+--------+--------+--------+--------+--------+
          .    |     25 |     16 |      7 |      3 |      4 |      1 |      0 |      .
               |      . |      . |      . |      . |      . |      . |      . |      .
               |      . |      . |      . |      . |      . |      . |      . |
               |      . |      . |      . |      . |      . |      . |      . |
      ---------+--------+--------+--------+--------+--------+--------+--------+
      YES      |     37 |     18 |     12 |      3 |      1 |      1 |      2 |     37
               |      . |  21.69 |  14.46 |   3.61 |   1.20 |   1.20 |   2.41 |  44.58
               |      . |  48.65 |  32.43 |   8.11 |   2.70 |   2.70 |   5.41 |
               |      . |  52.94 |  50.00 |  30.00 |  16.67 |  25.00 |  40.00 |
      ---------+--------+--------+--------+--------+--------+--------+--------+
      NO       |     27 |     16 |     12 |      7 |      5 |      3 |      3 |     46
               |      . |  19.28 |  14.46 |   8.43 |   6.02 |   3.61 |   3.61 |  55.42
               |      . |  34.78 |  26.09 |  15.22 |  10.87 |   6.52 |   6.52 |
               |      . |  47.06 |  50.00 |  70.00 |  83.33 |  75.00 |  60.00 |
      ---------+--------+--------+--------+--------+--------+--------+--------+
      TOTAL           .       34       24       10        6        4        5       83
                      .    40.96    28.92    12.05     7.23     4.82     6.02   100.00
```

Science Associate Degrees Offered

Table 378. Number and percent of institutions offering an associate degree in science, by percent of faculty having access to computers for administrative purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                   21:39 WEDNESDAY, SEPTEMBE

                                     TABLE OF OFFA BY FACINS

        OFFA      IS SCIENCE ASSOCIATE DEGREE OFFERED   FACINS    PERC FACULTY USE FOR CLASS INSTRUCTION

        FREQUENCY|
        PERCENT  |
        ROW PCT  |
        COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
        ---------+--------+--------+--------+--------+--------+--------+--------+
        .        |     22 |      8 |     12 |      4 |      6 |      1 |      3 |      .
                 |      . |      . |      . |      . |      . |      . |      . |      .
                 |      . |      . |      . |      . |      . |      . |      . |
                 |      . |      . |      . |      . |      . |      . |      . |
        ---------+--------+--------+--------+--------+--------+--------+--------+
        YES      |     38 |     10 |     16 |      5 |      2 |      0 |      3 |     36
                 |      . |  11.76 |  18.82 |   5.88 |   2.35 |   0.00 |   3.53 |  42.35
                 |      . |  27.78 |  44.44 |  13.89 |   5.56 |   0.00 |   8.33 |
                 |      . |  40.00 |  47.06 |  38.46 |  28.57 |   0.00 |  60.00 |
        ---------+--------+--------+--------+--------+--------+--------+--------+
        NO       |     24 |     15 |     18 |      8 |      5 |      1 |      2 |     49
                 |      . |  17.65 |  21.18 |   9.41 |   5.88 |   1.18 |   2.35 |  57.65
                 |      . |  30.61 |  36.73 |  16.33 |  10.20 |   2.04 |   4.08 |
                 |      . |  60.00 |  52.94 |  61.54 |  71.43 | 100.00 |  40.00 |
        ---------+--------+--------+--------+--------+--------+--------+--------+
        TOTAL           .       25       34       13        7        1        5       85
                        .    29.41    40.00    15.29     8.24     1.18     5.88   100.00
```

Percent of Faculty Having Access to Computers for Instructional Purposes

Science Associate Degrees Offered

Table 379. Number and percent of institutions offering an associate degree in science, by percent of faculty having access to computers for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Science Associate Degrees Offered

```
                              TABLE OF OFFA BY FACRES

OFFA       IS SCIENCE ASSOCIATE DEGREE OFFERED   FACRES    PERC FACULTY USE FOR RESEARCH

FREQUENCY| Percent of Faculty Having Access to Computers for Research Purposes
 PERCENT |
 ROW PCT |
 COL PCT |       .|        0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     25 |     11 |     13 |      3 |      3 |      0 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     37 |      9 |     18 |      7 |      2 |      0 |      1 |     37
         |      . |  10.59 |  21.18 |   8.24 |   2.35 |   0.00 |   1.18 |  43.53
         |      . |  24.32 |  48.65 |  18.92 |   5.41 |   0.00 |   2.70 |
         |      . |  47.37 |  47.37 |  36.84 |  28.57 |   0.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     25 |     10 |     20 |     12 |      5 |      1 |      0 |     48
         |      . |  11.76 |  23.53 |  14.12 |   5.88 |   1.18 |   0.00 |  56.47
         |      . |  20.83 |  41.67 |  25.00 |  10.42 |   2.08 |   0.00 |
         |      . |  52.63 |  52.63 |  63.16 |  71.43 | 100.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       19       38       19        7        1        1       85
                .    22.35    44.71    22.35     8.24     1.18     1.18   100.00
```

Table 380. Number and percent of institutions offering an associate degree in science, by percent of faculty having access to computers for research purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions,

```
                     S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                        21:39 WEDNESDAY, SEPTEMB

                                   TABLE OF OFFA BY FACGE

     OFFA      IS SCIENCE ASSOCIATE DEGREE OFFERED   FACGE     PERC FACULTY USE FOR GAMES-EXPERIMENT

     FREQUENCY| Percent of Faculty Having Access to Computers for Games-Experimental Purposes
     PERCENT  |
     ROW PCT  |
     COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
     ---------+--------+--------+--------+--------+--------+--------+--------+
         .    |     34 |     12 |      3 |      2 |      5 |      0 |      0 |      .
              |      . |      . |      . |      . |      . |      . |      . |      .
              |      . |      . |      . |      . |      . |      . |      . |
              |      . |      . |      . |      . |      . |      . |      . |
     ---------+--------+--------+--------+--------+--------+--------+--------+
     YES      |     44 |     10 |     16 |      1 |      1 |      1 |      1 |     30
              |      . |  14.49 |  23.19 |   1.45 |   1.45 |   1.45 |   1.45 |  43.48
              |      . |  33.33 |  53.33 |   3.33 |   3.33 |   3.33 |   3.33 |
              |      . |  33.33 |  55.17 |  20.00 |  33.33 | 100.00 | 100.00 |
     ---------+--------+--------+--------+--------+--------+--------+--------+
     NO       |     34 |     20 |     13 |      4 |      2 |      0 |      0 |     39
              |      . |  28.99 |  18.84 |   5.80 |   2.90 |   0.00 |   0.00 |  56.52
              |      . |  51.28 |  33.33 |  10.26 |   5.13 |   0.00 |   0.00 |
              |      . |  66.67 |  44.83 |  80.00 |  66.67 |   0.00 |   0.00 |
     ---------+--------+--------+--------+--------+--------+--------+--------+
     TOTAL           .       30       29        5        3        1        1       69
                     .    43.48    42.03     7.25     4.35     1.45     1.45   100.00
```

Science Associate Degrees Offered

Table 381. Number and percent of institutions offering an associate degree in science, by percent of faculty having access to computers for games-experimental purposes as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                              TABLE OF OFFB BY FACADM

OFFB      IS SCIENCE BACHELORS OFFERED   FACADM    PERC FACULTY USE FOR ADMIN OF CLASSES

FREQUENCY| Percent of Faculty Having Access to Computers for Administrative Purposes
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |     26 |     18 |      6 |      4 |      4 |      2 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     28 |     23 |     19 |      8 |      6 |      3 |      1 |     60
         |      . |  28.75 |  23.75 |  10.00 |   7.50 |   3.75 |   1.25 |  75.00
         |      . |  38.33 |  31.67 |  13.33 |  10.00 |   5.00 |   1.67 |
         |      . |  71.88 |  76.00 |  88.89 | 100.00 | 100.00 |  20.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     35 |      9 |      6 |      1 |      0 |      0 |      4 |     20
         |      . |  11.25 |   7.50 |   1.25 |   0.00 |   0.00 |   5.00 |  25.00
         |      . |  45.00 |  30.00 |   5.00 |   0.00 |   0.00 |  20.00 |
         |      . |  28.13 |  24.00 |  11.11 |   0.00 |   0.00 |  80.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       32       25        9        6        3        5       80
                .    40.00    31.25    11.25     7.50     3.75     6.25   100.00
```

Science Bachelors Degrees Offered

Table 382. Number and percent of institutions offering a bachelors degree in science, by percent of faculty having access to computers for administrative purposes as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                                     TABLE OF OFFB BY FACINS

OFFB      IS SCIENCE BACHELORS OFFERED   FACINS    PERC FACULTY USE FOR CLASS INSTRUCTION

FREQUENCY|Percent of Faculty Having Access to Computers for Instructional Purposes
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     23 |     10 |     12 |      4 |      6 |      1 |      4 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     26 |     17 |     24 |     12 |      5 |      1 |      3 |     62
         |      . |  20.73 |  29.27 |  14.63 |   6.10 |   1.22 |   3.66 |  75.61
         |      . |  27.42 |  38.71 |  19.35 |   8.06 |   1.61 |   4.84 |
         |      . |  73.91 |  70.59 |  92.31 |  71.43 | 100.00 |  75.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     35 |      6 |     10 |      1 |      2 |      0 |      1 |     20
         |      . |   7.32 |  12.20 |   1.22 |   2.44 |   0.00 |   1.22 |  24.39
         |      . |  30.00 |  50.00 |   5.00 |  10.00 |   0.00 |   5.00 |
         |      . |  26.09 |  29.41 |   7.69 |  28.57 |   0.00 |  25.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       23       34       13        7        1        4       82
                .    28.05    41.46    15.85     8.54     1.22     4.88   100.00
```

Science Bachelors Degrees Offered

Table 383. Number and percent of institutions offering a bachelors degree in science, by percent of faculty having access to computers for instructional purposes as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                     TABLE OF OFFB BY FACRES

OFFB      IS SCIENCE BACHELORS OFFERED   FACRES    PERC FACULTY USE FOR RESEARCH

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     25 |     12 |     15 |      4 |      3 |      0 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     25 |     10 |     28 |     17 |      6 |      1 |      1 |     63
         |      . |  12.35 |  34.57 |  20.99 |   7.41 |   1.23 |   1.23 |  77.78
         |      . |  15.87 |  44.44 |  26.98 |   9.52 |   1.59 |   1.59 |
         |      . |  55.56 |  77.78 |  94.44 |  85.71 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     37 |      8 |      8 |      1 |      1 |      0 |      0 |     18
         |      . |   9.88 |   9.88 |   1.23 |   1.23 |   0.00 |   0.00 |  22.22
         |      . |  44.44 |  44.44 |   5.56 |   5.56 |   0.00 |   0.00 |
         |      . |  44.44 |  22.22 |   5.56 |  14.29 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       18       36       18        7        1        1       81
                .    22.22    44.44    22.22     8.64     1.23     1.23   100.00
```

Percent of Faculty Having Access to Computers for Research Purposes

Science Bachelors Degrees Offered

Table 384. Number and percent of institutions offering a bachelors degree in science, by percent of faculty having access to computers for research purposes as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                              TABLE OF OFFB BY FACGE

OFFB     IS SCIENCE BACHELORS OFFERED    FACGE     PERC FACULTY USE FOR GAMES-EXPERIMENT

FREQUENCY|  Percent of Faculty Having Access to Computers for Games-Experimental Purposes
 PERCENT |
 ROW PCT |
 COL PCT |       .|        0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+---------+--------+--------+--------+--------+--------+
    .    |     35 |      13 |      4 |      3 |      5 |      0 |      0 |       .
         |      . |       . |      . |      . |      . |      . |      . |       .
         |      . |       . |      . |      . |      . |      . |      . |
         |      . |       . |      . |      . |      . |      . |      . |
---------+--------+---------+--------+--------+--------+--------+--------+
YES      |     40 |      23 |     19 |      4 |      2 |      0 |      0 |      48
         |      . |   34.85 |  28.79 |   6.06 |   3.03 |   0.00 |   0.00 |   72.73
         |      . |   47.92 |  39.58 |   8.33 |   4.17 |   0.00 |   0.00 |
         |      . |   79.31 |  67.86 | 100.00 |  66.67 |   0.00 |   0.00 |
---------+--------+---------+--------+--------+--------+--------+--------+
NO       |     37 |       6 |      9 |      0 |      1 |      1 |      1 |      18
         |      . |    9.09 |  13.64 |   0.00 |   1.52 |   1.52 |   1.52 |   27.27
         |      . |   33.33 |  50.00 |   0.00 |   5.56 |   5.56 |   5.56 |
         |      . |   20.69 |  32.14 |   0.00 |  33.33 | 100.00 | 100.00 |
---------+--------+---------+--------+--------+--------+--------+--------+
TOTAL             .       29       28        4        3        1        1       66
                  .    43.94    42.42     6.06     4.55     1.52     1.52   100.00
```

Science Bachelors Degrees Offered

Table 385. Number and percent of institutions offering a bachelors degree in science, by percent of faculty having access to computers for games-experimental purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Science Masters Degrees Offered

```
                              TABLE OF OFFM BY FACADM

OFFM      IS SCIENCE MASTERS OFFERED   FACADM    PERC FACULTY USE FOR ADMIN OF CLASSES

FREQUENCY|  Percent of Faculty Having Access to Computer for Administrative Purposes
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |     28 |     18 |      6 |      4 |      4 |      2 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      6 |     10 |     14 |      4 |      2 |      3 |      0 |     33
         |      . |  12.50 |  17.50 |   5.00 |   2.50 |   3.75 |   0.00 |  41.25
         |      . |  30.30 |  42.42 |  12.12 |   6.06 |   9.09 |   0.00 |
         |      . |  31.25 |  56.00 |  44.44 |  33.33 | 100.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     55 |     22 |     11 |      5 |      4 |      0 |      5 |     47
         |      . |  27.50 |  13.75 |   6.25 |   5.00 |   0.00 |   6.25 |  58.75
         |      . |  46.81 |  23.40 |  10.64 |   8.51 |   0.00 |  10.64 |
         |      . |  68.75 |  44.00 |  55.56 |  66.67 |   0.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       32       25        9        6        3        5       80
                .    40.00    31.25    11.25     7.50     3.75     6.25   100.00
```

Table 386. Number and percent of institutions offering a masters degree in science, by percent of faculty having access to computers for administrative purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                              TABLE OF OFFM BY FACINS

OFFM       IS SCIENCE MASTERS OFFERED   FACINS    PERC FACULTY USE FOR CLASS INSTRUCTION

FREQUENCY| Percent of Faculty Having Access to Computers for Instructional Purposes
 PERCENT |
 ROW PCT |
 COL PCT |        .|        0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |      25 |      10 |      12 |       4 |       6 |       1 |       4 |       .
         |       . |       . |       . |       . |       . |       . |       . |       .
         |       . |       . |       . |       . |       . |       . |       . |
         |       . |       . |       . |       . |       . |       . |       . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |       6 |       6 |      14 |       9 |       1 |       1 |       2 |      33
         |       . |    7.32 |   17.07 |   10.98 |    1.22 |    1.22 |    2.44 |   40.24
         |       . |   18.18 |   42.42 |   27.27 |    3.03 |    3.03 |    6.06 |
         |       . |   26.09 |   41.18 |   69.23 |   14.29 |  100.00 |   50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |      53 |      17 |      20 |       4 |       6 |       0 |       2 |      49
         |       . |   20.73 |   24.39 |    4.88 |    7.32 |    0.00 |    2.44 |   59.76
         |       . |   34.69 |   40.82 |    8.16 |   12.24 |    0.00 |    4.08 |
         |       . |   73.91 |   58.82 |   30.77 |   85.71 |    0.00 |   50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL            .       23        34        13         7         1         4        82
                 .    28.05     41.46     15.85      8.54      1.22      4.88    100.00
```

Science Masters Degrees Offered

Table 387. Number and percent of institutions offering a masters degree in science, by percent of faculty having access to computers for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF OFFM BY FACRES

OFFM      IS SCIENCE MASTERS OFFERED     FACRES     PERC FACULTY USE FOR RESEARCH

FREQUENCY| Percent of Faculty Having Access to Computers for Research Purposes
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40%  |41%-60%  |61%-80%  |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     27 |     12 |     15 |      4 |      3 |      0 |      1 |     .
         |      . |      . |      . |      . |      . |      . |      . |     .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      5 |      4 |     14 |     10 |      4 |      1 |      1 |     34
         |      . |   4.94 |  17.28 |  12.35 |   4.94 |   1.23 |   1.23 |  41.98
         |      . |  11.76 |  41.18 |  29.41 |  11.76 |   2.94 |   2.94 |
         |      . |  22.22 |  38.89 |  55.56 |  57.14 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     55 |     14 |     22 |      8 |      3 |      0 |      0 |     47
         |      . |  17.28 |  27.16 |   9.88 |   3.70 |   0.00 |   0.00 |  58.02
         |      . |  29.79 |  46.81 |  17.02 |   6.38 |   0.00 |   0.00 |
         |      . |  77.78 |  61.11 |  44.44 |  42.86 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       18       36       18        7        1        1       81
                .    22.22    44.44    22.22     8.64     1.23     1.23   100.00
```

Science Masters Degrees Offered

Table 388. Number and percent of institutions offering a masters degree in science, by percent of faculty having access to computers for research purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                                TABLE OF OFFM BY FACGE

OFFM       IS SCIENCE MASTERS OFFERED   FACGE     PERC FACULTY USE FOR GAMES-EXPERIMENT

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |     37 |     13 |      4 |      3 |      5 |      0 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     15 |     11 |     12 |      1 |      0 |      0 |      0 |     24
         |      . |  16.67 |  18.18 |   1.52 |   0.00 |   0.00 |   0.00 |  36.36
         |      . |  45.83 |  50.00 |   4.17 |   0.00 |   0.00 |   0.00 |
         |      . |  37.93 |  42.86 |  25.00 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     60 |     18 |     16 |      3 |      3 |      1 |      1 |     42
         |      . |  27.27 |  24.24 |   4.55 |   4.55 |   1.52 |   1.52 |  63.64
         |      . |  42.86 |  38.10 |   7.14 |   7.14 |   2.38 |   2.38 |
         |      . |  62.07 |  57.14 |  75.00 | 100.00 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       29       28        4        3        1        1       66
                .    43.94    42.42     6.06     4.55     1.52     1.52   100.00
```

Percent of Faculty Having Access to Computers for Games-Experimental Purposes

Science Masters Degrees Offered

-510-

Table 389. Number and percent of institutions offering a masters degree in science, by percent of faculty having access to computers for games-experimental purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

700

703

```
                        TABLE OF OFFD BY FACADM

OFFD      IS SCIENCE DOCTCRATE OFFERED   FACADM    PERC FACULTY USE FOR ADMIN OF CLASSES

FREQUENCY| Percent of Faculty Having Access to Computers for Administrative Purposes
PERCENT  |
ROW PCT  |
COL PCT  |      .|      0|1%-20% |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+-------+-------+--------+-------+--------+-------+--------+
   .     |    28 |    20 |      7 |     4 |      5 |     2 |      0 |      .
         |     . |     . |      . |     . |      . |     . |      . |      .
         |     . |     . |      . |     . |      . |     . |      . |
         |     . |     . |      . |     . |      . |     . |      . |
---------+-------+-------+--------+-------+--------+-------+--------+
YES      |     5 |     3 |      5 |     1 |      0 |     1 |      0 |     10
         |     . |  3.95 |   6.58 |  1.32 |   0.00 |  1.32 |   0.00 |  13.16
         |     . | 30.00 |  50.00 | 10.00 |   0.00 | 10.00 |   0.00 |
         |     . | 10.00 |  20.83 | 11.11 |   0.00 | 33.33 |   0.00 |
---------+-------+-------+--------+-------+--------+-------+--------+
NO       |    56 |    27 |     19 |     8 |      5 |     2 |      5 |     66
         |     . | 35.53 |  25.00 | 10.53 |   6.58 |  2.63 |   6.58 |  86.84
         |     . | 40.91 |  28.79 | 12.12 |   7.58 |  3.03 |   7.58 |
         |     . | 90.00 |  79.17 | 88.89 | 100.00 | 66.67 | 100.00 |
---------+-------+-------+--------+-------+--------+-------+--------+
TOTAL          .      30       24       9        5       3        5       76
               .   39.47    31.58   11.84     6.58    3.95     6.58   100.00
```

Science Doctorate Degrees Offered

Table 390. Number and percent of institutions offering a doctorate degree in science, by percent of faculty having access to computers for administrative purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                              TABLE OF OFFD BY FACINS

OFFD      IS SCIENCE DOCTORATE OFFERED   FACINS    PERC FACULTY USE FOR CLASS INSTRUCTION

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     25 |     11 |     13 |      5 |      6 |      1 |      5 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      6 |      2 |      3 |      3 |      0 |      1 |      0 |      9
         |      . |   2.56 |   3.85 |   3.85 |   0.00 |   1.28 |   0.00 |  11.54
         |      . |  22.22 |  33.33 |  33.33 |   0.00 |  11.11 |   0.00 |
         |      . |   9.09 |   9.09 |  25.00 |   0.00 | 100.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     53 |     20 |     30 |      9 |      7 |      0 |      3 |     69
         |      . |  25.64 |  38.46 |  11.54 |   8.97 |   0.00 |   3.85 |  88.46
         |      . |  28.99 |  43.48 |  13.04 |  10.14 |   0.00 |   4.35 |
         |      . |  90.91 |  90.91 |  75.00 | 100.00 |   0.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       22       33       12        7        1        3       78
                .    28.21    42.31    15.38     8.97     1.28     3.85   100.00
```

Percent of Faculty Having Access to Computers for Instructional Purposes

Science Doctorate Degrees Offered

-512-

Table 391. Number and percent of institutions offering a doctorate degree in science, by percent of faculty having access to computers for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                          TABLE OF OFFD BY FACRES

OFFD       IS SCIENCE DOCTORATE OFFERED    FACRES    PERC FACULTY USE FOR RESEARCH

FREQUENCY|  Percent of Faculty Having Access to Computers for Research Purposes
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     27 |     13 |     16 |      5 |      3 |      0 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |      5 |      0 |      5 |      3 |      1 |      1 |      0 |     10
         |      . |   0.00 |   6.49 |   3.90 |   1.30 |   1.30 |      . |  12.99
         |      . |   0.00 |  50.00 |  30.00 |  10.00 |  10.00 |      . |
         |      . |   0.00 |  14.29 |  17.65 |  14.29 | 100.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     55 |     17 |     30 |     14 |      6 |      0 |      0 |     67
         |      . |  22.08 |  38.96 |  18.18 |   7.79 |   0.00 |      . |  87.01
         |      . |  25.37 |  44.78 |  20.90 |   8.96 |   0.00 |      . |
         |      . | 100.00 |  85.71 |  82.35 |  85.71 |   0.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       17       35       17        7        1        .       77
                .    22.08    45.45    22.08     9.09     1.30        .   100.00
```

Science Doctorate Degrees Offered

Table 392. Number and percent of institutions offering a doctorate degree in science, by percent of faculty having access to computers for research purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Science Doctorate Degrees Offered

```
                         TABLE OF OFFD BY FACGE

OFFD     IS SCIENCE DOCTORATE OFFERED   FACGE     PERC FACULTY USE FOR GAMES-EXPERIMENT

FREQUENCY| Percent of Faculty Having Access to Computers for Games-Experimental Purposes
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |     37 |     15 |      6 |      3 |      5 |      0 |      0 |     .
         |      . |      . |      . |      . |      . |      . |      . |     .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     10 |      2 |      2 |      1 |      0 |      0 |      0 |     5
         |      . |   3.23 |   3.23 |   1.61 |   0.00 |   0.00 |   0.00 |  8.06
         |      . |  40.00 |  40.00 |  20.00 |   0.00 |   0.00 |   0.00 |
         |      . |   7.41 |   7.69 |  25.00 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     65 |     25 |     24 |      3 |      3 |      1 |      1 |    57
         |      . |  40.32 |  38.71 |   4.84 |   4.84 |   1.61 |   1.61 | 91.94
         |      . |  43.86 |  42.11 |   5.26 |   5.26 |   1.75 |   1.75 |
         |      . |  92.59 |  92.31 |  75.00 | 100.00 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       27       26        4        3        1        1      62
                .    43.55    41.94     6.45     4.84     1.61     1.61  100.00
```

Table 393. Number and percent of institutions offering a doctorate degree in science, by percent of faculty having access to computers for games-experimental purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF MINOR BY FACADM

MINOR     IS SCIENCE MINOR OFFERED    FACADM    PERC FACULTY USE FOR ADMIN OF CLASSES

FREQUENCY|  Percent of Faculty Having Access to Computers for Administrative Purposes
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     25 |     19 |      7 |      3 |      5 |      1 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     35 |     18 |     18 |      5 |      3 |      2 |      2 |     48
         |      . |  22.78 |  22.78 |   6.33 |   3.80 |   2.53 |   2.53 |  60.76
         |      . |  37.50 |  37.50 |  10.42 |   6.25 |   4.17 |   4.17 |
         |      . |  58.06 |  75.00 |  50.00 |  60.00 |  50.00 |  40.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     29 |     13 |      6 |      5 |      2 |      2 |      3 |     31
         |      . |  16.46 |   7.59 |   6.33 |   2.53 |   2.53 |   3.80 |  39.24
         |      . |  41.94 |  19.35 |  16.13 |   6.45 |   6.45 |   9.68 |
         |      . |  41.94 |  25.00 |  50.00 |  40.00 |  50.00 |  60.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       31       24       10        5        4        5       79
                .    39.24    30.38    12.66     6.33     5.06     6.33   100.00
```

Minors in Science Offered

Table 394. Number and percent of institutions offering a minor in science, by percent of faculty having access to computers for administrative purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Minors in Science Offered

```
                              TABLE OF MINOR BY FACINS

MINOR     IS SCIENCE MINOR OFFERED   FACINS    PERC FACULTY USE FOR CLASS INSTRUCTION

FREQUENCY|Percent of Faculty Having Access to Computers for Instructional Purposes
 PERCENT |
 ROW PCT |
 COL PCT |        .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+---------+--------+--------+--------+--------+--------+--------+
    .    |      22 |     10 |     12 |      5 |      6 |      1 |      4 |      .
         |       . |      . |      . |      . |      . |      . |      . |      .
         |       . |      . |      . |      . |      . |      . |      . |
         |       . |      . |      . |      . |      . |      . |      . |
---------+---------+--------+--------+--------+--------+--------+--------+
YES      |      34 |     13 |     17 |     11 |      5 |      1 |      2 |     49
         |       . |  16.05 |  20.99 |  13.58 |   6.17 |   1.23 |   2.47 |  60.49
         |       . |  26.53 |  34.69 |  22.45 |  10.20 |   2.04 |   4.08 |
         |       . |  56.52 |  50.00 |  91.67 |  71.43 | 100.00 |  50.00 |
---------+---------+--------+--------+--------+--------+--------+--------+
NO       |      28 |     10 |     17 |      1 |      2 |      0 |      2 |     32
         |       . |  12.35 |  20.99 |   1.23 |   2.47 |   0.00 |   2.47 |  39.51
         |       . |  31.25 |  53.13 |   3.13 |   6.25 |   0.00 |   6.25 |
         |       . |  43.48 |  50.00 |   8.33 |  28.57 |   0.00 |  50.00 |
---------+---------+--------+--------+--------+--------+--------+--------+
TOTAL              .       23       34       12        7        1        4       81
                   .    28.40    41.98    14.81     8.64     1.23     4.94   100.00
```

Table 395. Number and percent of institutions offering a minor in science, by percent of faculty having access to computers for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                          TABLE OF MINOR BY FACRES

MINOR     IS SCIENCE MINOR OFFERED   FACRES    PERC FACULTY USE FOR RESEARCH

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     24 |     13 |     14 |      4 |      3 |      0 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     34 |      7 |     22 |     13 |      6 |      1 |      0 |     49
         |      . |   8.75 |  27.50 |  16.25 |   7.50 |   1.25 |      . |  61.25
         |      . |  14.29 |  44.90 |  26.53 |  12.24 |   2.04 |      . |
         |      . |  41.18 |  59.46 |  72.22 |  85.71 | 100.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     29 |     10 |     15 |      5 |      1 |      0 |      0 |     31
         |      . |  12.50 |  18.75 |   6.25 |   1.25 |   0.00 |      . |  38.75
         |      . |  32.26 |  48.39 |  16.13 |   3.23 |   0.00 |      . |
         |      . |  58.82 |  40.54 |  27.78 |  14.29 |   0.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       17       37       18        7        1        .       80
                .    21.25    46.25    22.50     8.75     1.25        .   100.00
```

Percent of Faculty Having Access to Computers for Research Purposes

Minors in Science Offered

Table 396. Number and percent of institutions offering a minor in science, by percent of faculty having access to computers for research purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF MINOR BY FACGE

MINOR     IS SCIENCE MINOR OFFERED'  FACGE     PERC FACULTY USE FOR GAMES-EXPERIMENT

FREQUENCY|  Percent of Faculty Having Access to Computers for Games-Experimental Purposes
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
   .     |     33 |     14 |      5 |      3 |      5 |      0 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
YES      |     46 |     15 |     17 |      3 |      1 |      0 |      1 |     37
         |      . |  23.44 |  26.56 |   4.69 |   1.56 |   0.00 |   1.56 |  57.81
         |      . |  40.54 |  45.95 |   8.11 |   2.70 |   0.00 |   2.70 |
         |      . |  53.57 |  62.96 |  75.00 |  33.33 |   0.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
NO       |     33 |     13 |     10 |      1 |      2 |      1 |      0 |     27
         |      . |  20.31 |  15.63 |   1.56 |   3.13 |   1.56 |   0.00 |  42.19
         |      . |  48.15 |  37.04 |   3.70 |   7.41 |   3.70 |   0.00 |
         |      . |  46.43 |  37.04 |  25.00 |  66.67 | 100.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       28       27        4        3        1        1       64
                .    43.75    42.19     6.25     4.69     1.56     1.56   100.00
```

Minors in Science Offered

-518-

Table 397. Number and percent of institutions offering a minor in science, by percent of faculty having access to computers for games-experimental purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

doctoral degrees in the sciences, and to be inconsistently related to whether or not an institution offers an academic minor in the sciences.

L. Relationships between Science Degree Offerings and Efforts to Improve Academic Computing Capabilities

The ten tables examined in this section illustrate relationships between the level of degree offerings of minority higher education institutions and two indicators of institutional efforts to improve their academic computing status. The indicators of efforts to improve academic computing status are based on the responses of academic vice presidents/deans to the question "Have campus-wide study groups met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes?", and science department heads' responses to the question "Have study groups from your department met to plan for the acquisition or improvement of computer facilities and capabilities?".

From Tables 398 and 399 we see that there is no relationship between these indicators of institutional efforts to improve their computing status and whether or not an institution awards associate degrees in the sciences. Contingency coefficients associated with these tables equal 0.03 and 0.06, respectively.

Campus-wide computing study groups are substantially more likely to have met (Table 400) and departmental computing study groups are somewhat more likely to have met (Table 401) in institutions that award bachelors degrees in the sciences. Associated contingency coefficients are 0.31 and 0.16, respectively.

In institutions that award masters degrees in the sciences, campus-wide computing study groups are somewhat more likely to have met (Table 402; contingency coefficient equals 0.18), but the probability that departmental study

```
                    TABLE OF OFFA BY CWSG

OFFA      IS SCIENCE ASSOCIATE DEGREE OFFERED   CWSG      CAMPUS

FREQUENCY|  Campus-Wide Computer Groups Have Met
PERCENT  |
ROW PCT  |
COL PCT  |  .      |YES      |NO       |  TOTAL
---------+---------+---------+---------+
   .     |       0 |       3 |       3 |      .
         |       . |       . |       . |      .
         |       . |       . |       . |
         |       . |       . |       . |
---------+---------+---------+---------+
YES      |       3 |      25 |      13 |     38
         |       . |   34.25 |   17.81 |  52.05
         |       . |   65.79 |   34.21 |
         |       . |   51.02 |   54.17 |
---------+---------+---------+---------+
NO       |       1 |      24 |      11 |     35
         |       . |   32.88 |   15.07 |  47.95
         |       . |   68.57 |   31.43 |
         |       . |   48.98 |   45.83 |
---------+---------+---------+---------+
TOTAL            .        49        24       73
                 .     67.12     32.88   100.00
```

Science Associate Degrees Offered

Table 398. Number and percent of institutions offering an associate degree in science, by institutions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                          TABLE OF OFFA BY STUD

OFFA     IS SCIENCE ASSOCIATE DEGREE OFFERED   STUD      DEPT STUDY GROUP

FREQUENCY| Departmental Computer Groups Have Met
 PERCENT |
 ROW PCT |
 COL PCT |        |YES     |NO      |DO  NOT |PRES FAC|
         |       .|        |        |  KNOW  | EXCEL  |  TOTAL
---------+--------+--------+--------+--------+--------+
    .    |      1 |     34 |     18 |      2 |      1 |      .
         |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+
YES      |     14 |     36 |     21 |      3 |      0 |     60
         |      . |  29.51 |  17.21 |   2.46 |      . |  49.18
         |      . |  60.00 |  35.00 |   5.00 |      . |
         |      . |  49.32 |  51.22 |  37.50 |      . |
---------+--------+--------+--------+--------+--------+
NO       |     11 |     37 |     20 |      5 |      0 |     62
         |      . |  30.33 |  16.39 |   4.10 |      . |  50.82
         |      . |  59.68 |  32.26 |   8.06 |      . |
         |      . |  50.68 |  48.78 |  62.50 |      . |
---------+--------+--------+--------+--------+--------+
TOTAL           .       73       41        8        .      122
                .    59.84    33.61     6.56        .   100.00
```

Science Associate Degrees Offered

Table 399. Number and percent of institutions offering an associate degree in science, by institutions reporting departmental groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                    TABLE OF OFFB BY CWSG

OFFB      IS SCIENCE BACHELORS OFFERED   CWSG      CAMPUSWIDE STU

FREQUENCY|
PERCENT  |   Campus-Wide Computer Groups Have Met
ROW PCT  |
COL PCT  |  .      |YES     |NO      |  TOTAL
---------+--------+--------+--------+
  .      |      0 |      4 |      2 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |      1 |     32 |      8 |     40
         |      . |  43.84 |  10.96 |  54.79
         |      . |  80.00 |  20.00 |
         |      . |  66.67 |  32.00 |
---------+--------+--------+--------+
NO       |      3 |     16 |     17 |     33
         |      . |  21.92 |  23.29 |  45.21
         |      . |  48.48 |  51.52 |
         |      . |  33.33 |  68.00 |
---------+--------+--------+--------+
TOTAL           .       48       25       73
                .    65.75    34.25   100.00
```

Science Bachelors Degrees Offered

Table 400. Number and percent of institutions offering a bachelors degree in science, by institutions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
         S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                             -523-      21:39 WEDN

                           TABLE OF OFFB BY STUD

   OFFB        IS SCIENCE BACHELORS OFFERED   STUD       DEPT STUDY GROUP PLAN

   FREQUENCY|  Departmental Computer Groups Have Met
   PERCENT  |
   ROW PCT  |
   COL PCT  |        |YES     |NO      |DO  NOT |PRES FAC|
            |       .|        |        | KNOW   | EXCEL  |  TOTAL
   ---------+--------+--------+--------+--------+--------+
       .    |      2 |     36 |     19 |      2 |      1 |      .
            |      . |      . |      . |      . |      . |      .
            |      . |      . |      . |      . |      . |
            |      . |      . |      . |      . |      . |
   ---------+--------+--------+--------+--------+--------+
   YES      |     13 |     48 |     21 |      6 |      0 |     75
            |      . |  40.34 |  17.65 |   5.04 |      . |  63.03
            |      . |  64.00 |  28.00 |   8.00 |      . |
            |      . |  67.61 |  52.50 |  75.00 |      . |
   ---------+--------+--------+--------+--------+--------+
   NO       |     11 |     23 |     19 |      2 |      0 |     44
            |      . |  19.33 |  15.97 |   1.68 |      . |  36.97
            |      . |  52.27 |  43.18 |   4.55 |      . |
            |      . |  32.39 |  47.50 |  25.00 |      . |
   ---------+--------+--------+--------+--------+--------+
   TOTAL           .       71       40        8        .      119
                   .    59.66    33.61     6.72        .   100.00
```

Science Bachelors Degrees Offered

Table 401. Number and percent of institutions offering a bachelors degree in science, by institutions reporting departmental groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                -524-          21:36 WED

                      TABLE OF OFFM BY CWSG

OFFM        IS SCIENCE MASTERS OFFERED    CWSG        CAMPUSWIDE STU

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |    .    |YES     |NO      |  TOTAL
---------+---------+--------+--------+
   .     |       0 |      5 |      3 |      .
         |       . |      . |      . |      .
         |       . |      . |      . |
         |       . |      . |      . |
---------+---------+--------+--------+
YES      |       0 |     11 |      2 |     13
         |       . |  15.49 |   2.82 |  18.31
         |       . |  84.62 |  15.38 |
         |       . |  23.40 |   8.33 |
---------+---------+--------+--------+
NO       |       4 |     36 |     22 |     58
         |       . |  50.70 |  30.99 |  81.69
         |       . |  62.07 |  37.93 |
         |       . |  76.60 |  91.67 |
---------+---------+--------+--------+
TOTAL            .       47       24       71
                 .    66.20    33.80   100.00
```

Campus-Wide Computer Groups Have Met

Science Masters Degrees Offered

Table 402. Number and percent of institutions offering a masters degree in science, by institutions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

groups have met is only slightly higher than in institutions that do not offer science masters degrees. See Table 403; the associated contingency coefficient equals 0.09.

Responses to the question on campus-wide study groups were only provided by five academic vice presidents/deans in institutions that offered science doctorates, so the relationship between these variables cannot be ascertained (Table 404). However, the offering of a doctorate in science appears to be unrelated to the probability that departmental computer study groups will have met (See Table 405, and note the contingency coefficient of 0.05).

Whether or not an institution offers an academic minor in the sciences appears to be unrelated to either indicator of institutional efforts to improve their academic computing status (See Tables 406 and 407; contingency coefficients associated with these tables equal 0.02 and 0.09, respectively).

M. Relationships between Science Degree Productivity and Access to Academic Computing

The tables examined in this section illustrate relationships between the total numbers of degrees in science awarded by minority institutions during the academic years 1973-74 through 1978-79, and the indicators of access to academic computing discussed in Section A, above. Numbers of science degrees awarded during the five-year period are differentiated by level, from associate degrees to doctoral degrees. The rationale for exploring these relationships is merely to examine the possibility of yet another link between minority institutions' investments in academic computing and the extensiveness of their academic programs in the sciences. As with most other relationships examined in this report, claims to causality could not be supported by the data at hand even if strong relational evidence were to be found. Whether institutions that are more productive in the sciences are aided in this effort by providing

```
    S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                    -526-           21:39 WEDNE

                          TABLE OF OFFM BY STUD

       OFFM      IS SCIENCE MASTERS OFFERED    STUD       DEPT STUDY GROUP PLAN IMF

       FREQUENCY|
       PERCENT  |        Departmental Computer Groups Have Met
       ROW PCT  |
       COL PCT  |         |YES     |NO      |DO  NOT |PRES FAC|
                |        .|        |        | KNOW   | EXCEL  |  TOTAL
       ---------+--------+--------+--------+--------+--------+
           .    |       3 |     37 |     19 |      2 |      1 |      .
                |       . |      . |      . |      . |      . |      .
                |       . |      . |      . |      . |      . |
                |       . |      . |      . |      . |      . |
       ---------+--------+--------+--------+--------+--------+
       YES      |       1 |     25 |     11 |      2 |      0 |     38
                |       . |  21.19 |   9.32 |   1.69 |      . |  32.20
                |       . |  65.79 |  28.95 |   5.26 |      . |
                |       . |  35.71 |  27.50 |  25.00 |      . |
       ---------+--------+--------+--------+--------+--------+
       NO       |      22 |     45 |     29 |      6 |      0 |     80
                |       . |  38.14 |  24.58 |   5.08 |      . |  67.80
                |       . |  56.25 |  36.25 |   7.50 |      . |
                |       . |  64.29 |  72.50 |  75.00 |      . |
       ---------+--------+--------+--------+--------+--------+
       TOTAL           .       70       40        8        .      118
                       .    59.32    33.90     6.78        .   100.00
```

Science Masters Degrees Offered

Table 403. Number and percent of institutions offering a masters degree in science, by institutions reporting departmental groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Science Doctorate Degrees Offered

```
                        TABLE OF OFFD BY CWSG

OFFD      IS SCIENCE DOCTORATE OFFERED   CWSG       CAMPUSWIDE S

FREQUENCY| Campus-Wide Computer Groups Have Met
PERCENT  |
ROW PCT  |
COL PCT  |   .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
   .     |      0 |      6 |      3 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
YES      |      0 |      4 |      1 |      5
         |      . |   5.71 |   1.43 |   7.14
         |      . |  80.00 |  20.00 |
         |      . |   8.70 |   4.17 |
---------+--------+--------+--------+
NO       |      4 |     42 |     23 |     65
         |      . |  60.00 |  32.86 |  92.86
         |      . |  64.62 |  35.38 |
         |      . |  91.30 |  95.83 |
---------+--------+--------+--------+
TOTAL           .       46       24       70
                .    65.71    34.29   100.00
```

Table 404. Number and percent of institutions offering a doctorate degree in science, by institutions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Science Doctorate Degrees Offered

```
      S T A T I S T I C A L   A N A L Y S I S   S Y S T E M                21:39 WED

                          TABLE OF OFFD BY STUD

OFFD       IS SCIENCE DOCTORATE OFFERED    STUD       DEPT STUDY GROUP PLAN

FREQUENCY|        Departmental Computer Groups Have Met
 PERCENT |
 ROW PCT |
 COL PCT |        |YES     |NO      |DO  NOT |PRES FAC|
         |        |        |        | KNOW   | EXCEL  |  TOTAL
---------+--------+--------+--------+--------+--------+
   .     |      3 |     41 |     19 |      2 |      1 |      .
         |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+
YES      |      1 |      9 |      4 |      1 |      0 |     14
         |      . |   7.89 |   3.51 |   0.88 |      . |  12.28
         |      . |  64.29 |  28.57 |   7.14 |      . |
         |      . |  13.64 |  10.00 |  12.50 |      . |
---------+--------+--------+--------+--------+--------+
NO       |     22 |     57 |     36 |      7 |      0 |    100
         |      . |  50.00 |  31.58 |   6.14 |      . |  87.72
         |      . |  57.00 |  36.00 |   7.00 |      . |
         |      . |  86.36 |  90.00 |  87.50 |      . |
---------+--------+--------+--------+--------+--------+
TOTAL           .       66       40        8        .      114
                .    57.89    35.09     7.02        .   100.00
```

Table 405. Number and percent of institutions offering a doctorate degree in science, by institutions reporting departmental groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                        TABLE OF MINOR BY CWSG

MINOR     IS SCIENCE MINOR OFFERED   CWSG      CAMPUSWIDE STUDY

FREQUENCY |Campus-Wide Computer Groups Have Met
 PERCENT  |
 ROW PCT  |
 COL PCT  |   .     |YES     |NO      |  TOTAL
----------+---------+--------+--------+
    .     |       0 |      4 |      3 |     .
          |       . |      . |      . |     .
          |       . |      . |      . |
          |       . |      . |      . |
----------+---------+--------+--------+
YES       |       3 |     25 |     12 |    37
          |       . |  34.72 |  16.67 | 51.39
          |       . |  67.57 |  32.43 |
          |       . |  52.08 |  50.00 |
----------+---------+--------+--------+
NO        |       1 |     23 |     12 |    35
          |       . |  31.94 |  16.67 | 48.61
          |       . |  65.71 |  34.29 |
          |       . |  47.92 |  50.00 |
----------+---------+--------+--------+
TOTAL             .       48       24      72
                  .    66.67    33.33  100.00
```

Minor in Science Offered

Table 406. Number and percent of institutions offering a minor in science, by institutions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                          TABLE OF MINOR BY STUD

MINOR     IS SCIENCE MINOR OFFERED    STUD       DEPT STUDY GROUP PLAN IMPR

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |        |YES     |NO      |DO  NCT |PRES FAC|
         |       .|        |        |  KNOW  | EXCEL  |  TOTAL
---------+--------+--------+--------+--------+--------+
    .    |      1 |     38 |     18 |      2 |      1 |      .
         |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+
YES      |     11 |     40 |     26 |      6 |      0 |     72
         |      . |  33.90 |  22.03 |   5.08 |      . |  61.02
         |      . |  55.56 |  36.11 |   8.33 |      . |
         |      . |  57.97 |  63.41 |  75.00 |      . |
---------+--------+--------+--------+--------+--------+
NO       |     14 |     29 |     15 |      2 |      0 |     46
         |      . |  24.58 |  12.71 |   1.69 |      . |  38.98
         |      . |  63.04 |  32.61 |   4.35 |      . |
         |      . |  42.03 |  36.59 |  25.00 |      . |
---------+--------+--------+--------+--------+--------+
TOTAL           .       69       41        8        .      118
                .    58.47    34.75     6.78        .   100.00
```

Departmental Computer Groups Have Met

Minor in Science Offered

Table 407. Number and percent of institutions offering a minor in science, by institutions reporting departmental groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

access to academic computing for students and faculty in the sciences, or whether institutions with large and productive science departments can afford to provide greater access to academic computing cannot be ascertained. It may well be that these variables are mutually supportive.

Relationships between minority institutions' productivity in the sciences and their provision of access to academic computing for science faculty and students are summarized in Figure 7 and examined in greater detail in Tables 408 through 431. These data appear to support the following assertions: The probability that a minority institution has access to a computer is somewhat positively related to the number of associate degrees in science the institution awards, and is slightly positively related to the number of science bachelors degrees the institution awards. Whether institutional access to a computer is related to an institution's production of science graduates at the masters and doctoral levels cannot be determined from the data available, because of small sample sizes.

The probability that students and faculty in the sciences will be provided access to computers is slightly higher in institutions that award more associate science degrees, is moderately higher in institutions that award more bachelors degrees in the sciences, and appears to be unrelated to the number of masters degrees in the sciences an institution awards. Small sample size again precludes examining the relationship of this variable to the productivity of doctoral degrees in the sciences.

Undergraduate students in science departments have a slightly higher probability of gaining access to computers if they attend institutions that award more associate degrees in the sciences, but their chances appear to be unrelated to their institution's production of science bachelors or masters degrees. Here again, we do not have sufficient data to comment on the

Degrees Awarded (Productivity)	Indicator of Access to Computing Facilities					
	Institution Has Access to a Computer	Science Faculty and Students Have Access to a Computer	Science Undergrads Have Access to a Computer	Science Grads Students Have Access to a Computer	Science Faculty Have Access to a Computer	Computer is Located on Campus
Science Associate Degree	Table 408. Moderate positive relationship. Contingency coeff. = 0.39	Table 409. Slight positive relationship. Contingency coeff. = 0.41	Table 410. Slight positive relationship Contingency coeff. = 0.28	Table 411. Inconsistent relationship. Contingency coeff. = 0.52	Table 412. Inconsistent relationship. Contingency coeff. = 0.25	Table 413. No consistent relationship. Contingency coeff. - 0.32
Science Bachelors Degree	Table 414. Slight positive relationship. Contingency coeff. = 0.47	Table 415. Moderate positive relationship. Contingency coeff. = 0.51	Table 416. No relationship. Contingency coeff. = 0.16	Table 417. Moderate positive relationship Contingency coeff. = 0.55	Table 418. Slight positive relationship. Contingency coeff. = 0.27	Table 419. No relationship. Contingency coeff. = 0.24
Science Masters Degree	Table 420. Indeterminate due to small sample size.	Table 421. No relationship. (small sample) Contingency coeff. = 0.49	Table 422. No relationship. (small sample) Contingency coeff. = 0.35	Table 423. Indeterminate due to small sample size.	Table 424. No relationship. (small sample) Contingency coeff. = 0.49	Table 425. Indeterminate due to small sample size.
Science Doctoral Degree	Table 426. Indeterminate due to small sample size.	Table 427. Indeterminate due to small sample size.	Table 428. Indeterminate due to small sample size.	Table 429. Indeterminate due to small sample size.	Table 430. Indeterminate due to small sample size.	Table 431. Indeterminate due to small sample size.
Other Science Degrees	Table 432. Indeterminate due to small sample size.	Table 433. Indeterminate due to small sample size.	Table 434. Indeterminate due to small sample size.	Table 435. Indeterminate due to small sample size.	Table 436. Indeterminate due to small sample size.	Table 437. Indeterminate due to small sample size.

Figure 7. Summary of relationships between the degree productivity of minority higher education institutions and indicators of student and faculty access to academic computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments.

relationship to production of doctoral degrees.

Science graduate students have a slightly higher probability of gaining access to computers if they attend institutions that award more associate degrees in the sciences, and a moderately higher probability if they attend institutions that award more bachelors degrees in the sciences. Relationships between science graduate students' access to computers and their institutions' production of science masters and doctoral graduates are indeterminate because of small sample sizes.

It appears that faculty in the sciences have a slightly higher probability of gaining access to computers if they are employed in institutions that award more science bachelors degrees. Relationships between science faculty access to computers and their institution's production of other science degrees is either inconsistent (in the case of associate degrees), nonexistent (in the case of science masters degrees) or indeterminate due to small sample sizes (in the cases of science doctoral degrees and other science degrees).

From the data available, there is no evidence that whether or not a minority insitution has a computer located on its campus is related to its science degree productivity, regardless of the level of science degree considered. For the higher-level degrees (masters and doctorate) as well as "other science degrees," small sample sizes preclude reaching more than tentative conclusions on these relationships.

N. Relationships between Science Degree Productivity and the Computing Skills of Faculty and Students in the Sciences

This section contains an examination of relationships between the numbers of degrees in science that minority institutions awarded during the five academic years 1973-74 through 1978-79 and reports of science department heads on 1) the computing capabilities and skills of students who were newly enrolled in their departments in the fall of 1978, 2) the computing skills and

```
                    TABLE OF SCIAA BY INACOMP

       SCIAA      NUM SCIENCE ASSOCIATE DEGREES 74-79   INACOMP   DOES INSTI

       FREQUENCY| Institution Has Access to a Computer
       PERCENT  |
       ROW PCT  |
       COL PCT  |   .     |YES     |NO      |  TOTAL
       ---------+---------+--------+--------+
              . |       1 |     38 |      3 |      .
                |       . |      . |      . |      .
                |       . |      . |      . |
                |       . |      . |      . |
       ---------+---------+--------+--------+
       0-50     |       0 |     16 |      9 |     25
                |       . |  39.02 |  21.95 |  60.98
                |       . |  64.00 |  36.00 |
                |       . |  50.00 | 100.00 |
       ---------+---------+--------+--------+
       51-100   |       0 |      4 |      0 |      4
                |       . |   9.76 |   0.00 |   9.76
                |       . | 100.00 |   0.00 |
                |       . |  12.50 |   0.00 |
       ---------+---------+--------+--------+
       101-250  |       0 |      6 |      0 |      6
                |       . |  14.63 |   0.00 |  14.63
                |       . | 100.00 |   0.00 |
                |       . |  18.75 |   0.00 |
       ---------+---------+--------+--------+
       251-500  |       0 |      3 |      0 |      3
                |       . |   7.32 |   0.00 |   7.32
                |       . | 100.00 |   0.00 |
                |       . |   9.38 |   0.00 |
       ---------+---------+--------+--------+
       >1000    |       0 |      3 |      0 |      3
                |       . |   7.32 |   0.00 |   7.32
                |       . | 100.00 |   0.00 |
                |       . |   9.38 |   0.00 |
       ---------+---------+--------+--------+
       TOTAL            .       32        9       41
                        .    78.05    21.95   100.00
```

Science Associate Degrees Awarded

Table 408. Number and percent of institutions awarding various numbers of associate degrees in science, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                        TABLE OF SCIAA BY COMPAC

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79   COMPAC    FACULTY-ST

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |  .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |      9 |     92 |     31 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-50     |     12 |     12 |     12 |     24
         |      . |  21.82 |  21.82 |  43.64
         |      . |  50.00 |  50.00 |
         |      . |  30.77 |  75.00 |
---------+--------+--------+--------+
51-100   |      2 |      2 |      1 |      3
         |      . |   3.64 |   1.82 |   5.45
         |      . |  66.67 |  33.33 |
         |      . |   5.13 |   6.25 |
---------+--------+--------+--------+
101-250  |      1 |     12 |      0 |     12
         |      . |  21.82 |   0.00 |  21.82
         |      . | 100.00 |   0.00 |
         |      . |  30.77 |   0.00 |
---------+--------+--------+--------+
251-500  |      0 |     10 |      2 |     12
         |      . |  18.18 |   3.64 |  21.82
         |      . |  83.33 |  16.67 |
         |      . |  25.64 |  12.50 |
---------+--------+--------+--------+
>1000    |      1 |      3 |      1 |      4
         |      . |   5.45 |   1.82 |   7.27
         |      . |  75.00 |  25.00 |
         |      . |   7.69 |   6.25 |
---------+--------+--------+--------+
TOTAL           .       39       16       55
                .    70.91    29.09   100.00
```

Science Faculty or Students Have Access to a Computer

Science Associate Degrees Awarded

Table 409. Number and percent of institutions awarding various numbers of associate degrees in science, by institutions providing access to a computer for science faculty or students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
TABLE OF SCIAA BY UNDAC

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79   UNDAC      COMPUTE

FREQUENCY| Science Undergraduates Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |         .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |      38 |      86 |       8 |       .
         |       . |       . |       . |       .
         |       . |       . |       . |
         |       . |       . |       . |
---------+--------+--------+--------+
0-50     |      23 |      10 |       3 |      13
         |       . |   26.32 |    7.89 |   34.21
         |       . |   76.92 |   23.08 |
         |       . |   30.30 |   60.00 |
---------+--------+--------+--------+
51-100   |       3 |       2 |       0 |       2
         |       . |    5.26 |    0.00 |    5.26
         |       . |  100.00 |    0.00 |
         |       . |    6.06 |    0.00 |
---------+--------+--------+--------+
101-250  |       1 |      10 |       2 |      12
         |       . |   26.32 |    5.26 |   31.58
         |       . |   83.33 |   16.67 |
         |       . |   30.30 |   40.00 |
---------+--------+--------+--------+
251-500  |       4 |       8 |       0 |       8
         |       . |   21.05 |    0.00 |   21.05
         |       . |  100.00 |    0.00 |
         |       . |   24.24 |    0.00 |
---------+--------+--------+--------+
>1000    |       2 |       3 |       0 |       3
         |       . |    7.89 |    0.00 |    7.89
         |       . |  100.00 |    0.00 |
         |       . |    9.09 |    0.00 |
---------+--------+--------+--------+
TOTAL            .       33         5        38
                 .    86.84     13.16    100.00
```

Science Associate Degrees Awarded

Table 410. Number and percent of institutions awarding various numbers of associate degrees in science, by institutions providing access to a computer for science undergraduates, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF SCIAA BY GRADAC

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79   GRADAC    COMPUTERS AVAI

FREQUENCY| Science Graduate Students Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |         .|YES     |NO      |NOT APPL|  TOTAL
---------+--------+--------+--------+--------+
       . |      85 |      35 |      21 |       1 |      .
         |       . |       . |       . |       . |      .
         |       . |       . |       . |       . |
         |       . |       . |       . |       . |
---------+--------+--------+--------+--------+
0-50     |      27 |       5 |       4 |       0 |      9
         |       . |   23.81 |   19.05 |       . |  42.86
         |       . |   55.56 |   44.44 |       . |
         |       . |   33.33 |   66.67 |       . |
---------+--------+--------+--------+--------+
51-100   |       4 |       0 |       1 |       0 |      1
         |       . |    0.00 |    4.76 |       . |   4.76
         |       . |    0.00 |  100.00 |       . |
         |       . |    0.00 |   16.67 |       . |
---------+--------+--------+--------+--------+
101-250  |      11 |       1 |       1 |       0 |      2
         |       . |    4.76 |    4.76 |       . |   9.52
         |       . |   50.00 |   50.00 |       . |
         |       . |    6.67 |   16.67 |       . |
---------+--------+--------+--------+--------+
251-500  |       3 |       9 |       0 |       0 |      9
         |       . |   42.86 |    0.00 |       . |  42.86
         |       . |  100.00 |    0.00 |       . |
         |       . |   60.00 |    0.00 |       . |
---------+--------+--------+--------+--------+
>1000    |       5 |       0 |       0 |       0 |      0
         |       . |       . |       . |       . |   0.00
         |       . |       . |       . |       . |
         |       . |       . |       . |       . |
---------+--------+--------+--------+--------+
TOTAL            .        15         6         .       21
                 .     71.43     28.57         .   100.00
```

Science Associate Degrees Awarded

Table 411. Number and percent of institutions awarding various numbers of associate degrees in science, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                     TABLE OF SCIAA BY ACCFAC

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79   ACCFAC    COMP FACI

FREQUENCY|  Science Faculty Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |  .      |YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |     39 |     89 |      4 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-50     |     23 |     11 |      2 |     13
         |      . |  27.50 |   5.00 |  32.50
         |      . |  84.62 |  15.38 |
         |      . |  30.56 |  50.00 |
---------+--------+--------+--------+
51-100   |      3 |      2 |      0 |      2
         |      . |   5.00 |   0.00 |   5.00
         |      . | 100.00 |   0.00 |
         |      . |   5.56 |   0.00 |
---------+--------+--------+--------+
101-250  |      1 |     10 |      2 |     12
         |      . |  25.00 |   5.00 |  30.00
         |      . |  83.33 |  16.67 |
         |      . |  27.78 |  50.00 |
---------+--------+--------+--------+
251-500  |      2 |     10 |      0 |     10
         |      . |  25.00 |   0.00 |  25.00
         |      . | 100.00 |   0.00 |
         |      . |  27.78 |   0.00 |
---------+--------+--------+--------+
>1000    |      2 |      3 |      0 |      3
         |      . |   7.50 |   0.00 |   7.50
         |      . | 100.00 |   0.00 |
         |      . |   8.33 |   0.00 |
---------+--------+--------+--------+
TOTAL           .       36        4       40
                .    90.00    10.00   100.00
```

Science Associate Degrees Awarded

Table 412. Number and percent of institutions awarding various numbers of associate degrees in science, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF SCIAA BY CAMPCOMP

SCIAA      NUM SCIENCE ASSOCIATE DEGREES 74-79   CAMPCOMP  IS COMPUT

FREQUENCY| Computer is Located on Campus
PERCENT  |
ROW PCT  |
COL PCT  |         |YES      |NO       |
         |     .   |         |         |  TOTAL
---------+---------+---------+---------+
       . |       4 |      34 |       4 |      .
         |       . |       . |       . |      .
         |       . |       . |       . |
         |       . |       . |       . |
---------+---------+---------+---------+
0-50     |       9 |      10 |       6 |     16
         |       . |   31.25 |   18.75 |  50.00
         |       . |   62.50 |   37.50 |
         |       . |   47.62 |   54.55 |
---------+---------+---------+---------+
51-100   |       0 |       4 |       0 |      4
         |       . |   12.50 |    0.00 |  12.50
         |       . |  100.00 |    0.00 |
         |       . |   19.05 |    0.00 |
---------+---------+---------+---------+
101-250  |       0 |       4 |       2 |      6
         |       . |   12.50 |    6.25 |  18.75
         |       . |   66.67 |   33.33 |
         |       . |   19.05 |   18.18 |
---------+---------+---------+---------+
251-500  |       0 |       2 |       1 |      3
         |       . |    6.25 |    3.13 |   9.38
         |       . |   66.67 |   33.33 |
         |       . |    9.52 |    9.09 |
---------+---------+---------+---------+
>1000    |       0 |       1 |       2 |      3
         |       . |    3.13 |    6.25 |   9.38
         |       . |   33.33 |   66.67 |
         |       . |    4.76 |   18.18 |
---------+---------+---------+---------+
TOTAL            .        21        11       32
                 .     65.63     34.38   100.00
```

Science Associate Degrees Awarded

Table 413. Number and percent of institutions awarding various numbers of associate degrees in science, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF SCIBS BY INACOMP

SCIBS     NUM SCIENCE BACHELOR DEGREES 74-79     INACOMP     DOES INS

FREQUENCY| Institution Has Access to a Computer
 PERCENT |
 ROW PCT |
 COL PCT |  .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |      0 |     33 |      8 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-50     |      1 |      4 |      3 |      7
         |      . |   9.76 |   7.32 |  17.07
         |      . |  57.14 |  42.86 |
         |      . |  10.81 |  75.00 |
---------+--------+--------+--------+
51-100   |      0 |      3 |      0 |      3
         |      . |   7.32 |   0.00 |   7.32
         |      . | 100.00 |   0.00 |
         |      . |   8.11 |   0.00 |
---------+--------+--------+--------+
101-250  |      0 |      8 |      1 |      9
         |      . |  19.51 |   2.44 |  21.95
         |      . |  88.89 |  11.11 |
         |      . |  21.62 |  25.00 |
---------+--------+--------+--------+
251-500  |      0 |     10 |      0 |     10
         |      . |  24.39 |   0.00 |  24.39
         |      . | 100.00 |   0.00 |
         |      . |  27.03 |   0.00 |
---------+--------+--------+--------+
501-1000 |      0 |      7 |      0 |      7
         |      . |  17.07 |   0.00 |  17.07
         |      . | 100.00 |   0.00 |
         |      . |  18.92 |   0.00 |
---------+--------+--------+--------+
>1000    |      0 |      5 |      0 |      5
         |      . |  12.20 |   0.00 |  12.20
         |      . | 100.00 |   0.00 |
         |      . |  13.51 |   0.00 |
---------+--------+--------+--------+
TOTAL           .       37        4       41
                .    90.24     9.76   100.00
```

Science Bachelors Degrees Awarded

Table 414. Number and percent of institutions awarding various numbers of bachelors degrees in science, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF SCIBS BY COMPAC

SCIBS     NUM SCIENCE BACHELOR DEGREES 74-79    COMPAC    FACULTY-S

FREQUENCY| Science Faculty or Students Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |  .      |YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |      13 |      63 |      36 |      .
         |       . |       . |       . |      .
         |       . |       . |       . |
         |       . |       . |       . |
---------+--------+--------+--------+
0-50     |       3 |       5 |       7 |     12
         |       . |    6.33 |    8.86 |  15.19
         |       . |   41.67 |   58.33 |
         |       . |    7.35 |   63.64 |
---------+--------+--------+--------+
51-100   |       1 |       1 |       1 |      2
         |       . |    1.27 |    1.27 |   2.53
         |       . |   50.00 |   50.00 |
         |       . |    1.47 |    9.09 |
---------+--------+--------+--------+
101-250  |       4 |       8 |       0 |      8
         |       . |   10.13 |    0.00 |  10.13
         |       . |  100.00 |    0.00 |
         |       . |   11.76 |    0.00 |
---------+--------+--------+--------+
251-500  |       3 |      16 |       2 |     18
         |       . |   20.25 |    2.53 |  22.78
         |       . |   88.89 |   11.11 |
         |       . |   23.53 |   18.18 |
---------+--------+--------+--------+
501-1000 |       0 |      18 |       1 |     19
         |       . |   22.78 |    1.27 |  24.05
         |       . |   94.74 |    5.26 |
         |       . |   26.47 |    9.09 |
---------+--------+--------+--------+
>1000    |       1 |      20 |       0 |     20
         |       . |   25.32 |    0.00 |  25.32
         |       . |  100.00 |    0.00 |
         |       . |   29.41 |    0.00 |
---------+--------+--------+--------+
TOTAL            .        68        11       79
                 .     86.08     13.92   100.00
```

Science Bachelors Degrees Awarded

Table 415. Number and percent of institutions awarding various numbers of bachelors degrees in science, by institutions providing access to a computer for science faculty or students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                      TABLE OF SCIBS BY UNDAC

SCIBS     NUM SCIENCE BACHELOR DEGREES 74-79  UNDAC     COMPUTERS

FREQUENCY| Science Undergraduates Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |     49 |     54 |      9 |     .
         |      . |      . |      . |     .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-50     |      9 |      5 |      1 |      6
         |      . |   7.25 |   1.45 |   8.70
         |      . |  83.33 |  16.67 |
         |      . |   7.69 |  25.00 |
---------+--------+--------+--------+
51-100   |      2 |      1 |      0 |      1
         |      . |   1.45 |   0.00 |   1.45
         |      . | 100.00 |   0.00 |
         |      . |   1.54 |   0.00 |
---------+--------+--------+--------+
101-250  |      4 |      8 |      0 |      8
         |      . |  11.59 |   0.00 |  11.59
         |      . | 100.00 |   0.00 |
         |      . |  12.31 |   0.00 |
---------+--------+--------+--------+
251-500  |      4 |     16 |      1 |     17
         |      . |  23.19 |   1.45 |  24.64
         |      . |  94.12 |   5.88 |
         |      . |  24.62 |  25.00 |
---------+--------+--------+--------+
501-1000 |      0 |     18 |      1 |     19
         |      . |  26.09 |   1.45 |  27.54
         |      . |  94.74 |   5.26 |
         |      . |  27.69 |  25.00 |
---------+--------+--------+--------+
>1000    |      3 |     17 |      1 |     18
         |      . |  24.64 |   1.45 |  26.09
         |      . |  94.44 |   5.56 |
         |      . |  26.15 |  25.00 |
---------+--------+--------+--------+
TOTAL           .       65        4       69
                .    94.20     5.80   100.00
```

Science Bachelors Degrees Awarded

Table 416. Number and percent of institutions awarding various numbers of bachelors degrees in science, by institutions providing access to a computer for science undergraduates, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
              S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                      -543-          21:39 WEDNESD

                               TABLE OF SCIBS BY GRADAC

          SCIBS      NUM SCIENCE BACHELOR DEGREES 74-79    GRADAC     COMPUTERS AVAIL

          FREQUENCY| Science Graduate Students Have Access to a Computer
          PERCENT  |
          ROW PCT  |
          COL PCT  |         .|YES     |NO      |NOT APPL|  TOTAL
          ---------+--------+--------+--------+--------+
                  .|      87 |     12 |     13 |      0 |      .
                   |       . |      . |      . |      . |      .
                   |       . |      . |      . |      . |
                   |       . |      . |      . |      . |
          ---------+--------+--------+--------+--------+
          0-50     |      13 |      1 |      1 |      0 |      2
                   |       . |   2.33 |   2.33 |   0.00 |   4.65
                   |       . |  50.00 |  50.00 |   0.00 |
                   |       . |   2.63 |  25.00 |   0.00 |
          ---------+--------+--------+--------+--------+
          51-100   |       3 |      0 |      0 |      0 |      0
                   |       . |      . |      . |      . |   0.00
                   |       . |      . |      . |      . |
                   |       . |      . |      . |      . |
          ---------+--------+--------+--------+--------+
          101-250  |       8 |      2 |      1 |      1 |      4
                   |       . |   4.65 |   2.33 |   2.33 |   9.30
                   |       . |  50.00 |  25.00 |  25.00 |
                   |       . |   5.26 |  25.00 | 100.00 |
          ---------+--------+--------+--------+--------+
          251-500  |      17 |      3 |      1 |      0 |      4
                   |       . |   6.98 |   2.33 |   0.00 |   9.30
                   |       . |  75.00 |  25.00 |   0.00 |
                   |       . |   7.89 |  25.00 |   0.00 |
          ---------+--------+--------+--------+--------+
          501-1000 |       6 |     12 |      1 |      0 |     13
                   |       . |  27.91 |   2.33 |   0.00 |  30.23
                   |       . |  92.31 |   7.69 |   0.00 |
                   |       . |  31.58 |  25.00 |   0.00 |
          ---------+--------+--------+--------+--------+
          >1000    |       1 |     20 |      0 |      0 |     20
                   |       . |  46.51 |   0.00 |   0.00 |  46.51
                   |       . | 100.00 |   0.00 |   0.00 |
                   |       . |  52.63 |   0.00 |   0.00 |
          ---------+--------+--------+--------+--------+
          TOTAL            .       38        4        1       43
                           .    88.37     9.30     2.33   100.00
```

Science Bachelors Degrees Awarded

Table 417. Number and percent of institutions awarding various numbers of bachelors degrees in science, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                   -544-          21:39 WEDNES

                         TABLE OF SCIBS BY ACCFAC

           SCIBS     NUM SCIENCE BACHELOR DEGREES 74-79    ACCFAC    COMP FAC:

           FREQUENCY|  Science Faculty Have Access to a Computer
           PERCENT  |
           ROW PCT  |
           COL PCT  | .      |YES     |NO      |  TOTAL
           ---------+--------+--------+--------+
                  . |     49 |     58 |      5 |      .
                    |      . |      . |      . |      .
                    |      . |      . |      . |
                    |      . |      . |      . |
           ---------+--------+--------+--------+
           0-50     |      9 |      5 |      1 |      6
                    |      . |   7.14 |   1.43 |   8.57
                    |      . |  83.33 |  16.67 |
                    |      . |   7.46 |  33.33 |
           ---------+--------+--------+--------+
           51-100   |      2 |      1 |      0 |      1
                    |      . |   1.43 |   0.00 |   1.43
                    |      . | 100.00 |   0.00 |
                    |      . |   1.49 |   0.00 |
           ---------+--------+--------+--------+
           101-250  |      4 |      7 |      1 |      8
                    |      . |  10.00 |   1.43 |  11.43
                    |      . |  87.50 |  12.50 |
                    |      . |  10.45 |  33.33 |
           ---------+--------+--------+--------+
           251-500  |      4 |     16 |      1 |     17
                    |      . |  22.86 |   1.43 |  24.29
                    |      . |  94.12 |   5.88 |
                    |      . |  23.88 |  33.33 |
           ---------+--------+--------+--------+
           501-1000 |      1 |     18 |      0 |     18
                    |      . |  25.71 |   0.00 |  25.71
                    |      . | 100.00 |   0.00 |
                    |      . |  26.87 |   0.00 |
           ---------+--------+--------+--------+
           >1000    |      1 |     20 |      0 |     20
                    |      . |  28.57 |   0.00 |  28.57
                    |      . | 100.00 |   0.00 |
                    |      . |  29.85 |   0.00 |
           ---------+--------+--------+--------+
           TOTAL           .       67        3       70
                           .    95.71     4.29   100.00
```

Science Bachelors Degrees Awarded

Table 418. Number and percent of institutions awarding various numbers of bachelors degrees in science, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                        TABLE OF SCIBS BY CAMPCOMP

SCIBS     NUM SCIENCE BACHELOR DEGREES 74-79   CAMPCOMP  IS COMPUTE

FREQUENCY| Computer is Located on Campus
PERCENT  |
ROW PCT  |
COL PCT  |        |YES     |NO      |
         |       .|        |        |  TOTAL
---------+--------+--------+--------+
       . |       8|      20|      13|      .
         |       .|       .|       .|      .
         |       .|       .|       .|
         |       .|       .|       .|
---------+--------+--------+--------+
0-50     |       4|       4|       0|      4
         |       .|   10.81|    0.00|  10.81
         |       .|  100.00|    0.00|
         |       .|   11.43|    0.00|
---------+--------+--------+--------+
51-100   |       0|       3|       0|      3
         |       .|    8.11|    0.00|   8.11
         |       .|  100.00|    0.00|
         |       .|    8.57|    0.00|
---------+--------+--------+--------+
101-250  |       1|       7|       1|      8
         |       .|   18.92|    2.70|  21.62
         |       .|   87.50|   12.50|
         |       .|   20.00|   50.00|
---------+--------+--------+--------+
251-500  |       0|       9|       1|     10
         |       .|   24.32|    2.70|  27.03
         |       .|   90.00|   10.00|
         |       .|   25.71|   50.00|
---------+--------+--------+--------+
501-1000 |       0|       7|       0|      7
         |       .|   18.92|    0.00|  18.92
         |       .|  100.00|    0.00|
         |       .|   20.00|    0.00|
---------+--------+--------+--------+
>1000    |       0|       5|       0|      5
         |       .|   13.51|    0.00|  13.51
         |       .|  100.00|    0.00|
         |       .|   14.29|    0.00|
---------+--------+--------+--------+
TOTAL            .       35        2       37
                 .    94.59     5.41   100.00
```

Science Bachelors Degrees Awarded

Table 419. Number and percent of institutions awarding various numbers of bachelors degrees in science, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                 TABLE OF SCIMS BY INACOMP

     SCIMS     NUM SCIENCE MASTER DEGREES 74-79   INACOMP   DOES INSTIT

          FREQUENCY| Institution Has Access to a Compu
          PERCENT  |
          ROW PCT  |
          COL PCT  |   .      |YES     |NO      |  TOTAL
          ---------+--------+--------+--------+
               .   |       1 |      57 |      10 |      .
                   |       . |       . |       . |      .
                   |       . |       . |       . |
                   |       . |       . |       . |
          ---------+--------+--------+--------+
          0-10     |       0 |       2 |       2 |      4
                   |       . |   13.33 |   13.33 |  26.67
                   |       . |   50.00 |   50.00 |
                   |       . |   15.38 |  100.00 |
          ---------+--------+--------+--------+
          26-50    |       0 |       2 |       0 |      2
                   |       . |   13.33 |    0.00 |  13.33
                   |       . |  100.00 |    0.00 |
                   |       . |   15.38 |    0.00 |
          ---------+--------+--------+--------+
          51-100   |       0 |       2 |       0 |      2
                   |       . |   13.33 |    0.00 |  13.33
                   |       . |  100.00 |    0.00 |
                   |       . |   15.38 |    0.00 |
          ---------+--------+--------+--------+
          >100     |       0 |       7 |       0 |      7
                   |       . |   46.67 |    0.00 |  46.67
                   |       . |  100.00 |    0.00 |
                   |       . |   53.85 |    0.00 |
          ---------+--------+--------+--------+
          TOTAL            .       13         2       15
                           .    86.67     13.33   100.00

     Science Masters Degrees Awarded
```

Table 420. Number and percent of institutions awarding various numbers of masters degrees in science, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF SCIMS BY COMPAC

     SCIMS      NUM SCIENCE MASTER DEGREES 74-79   COMPAC    FACULTY-STU

     FREQUENCY| Science Faculty or Students Have Access to a Computer
      PERCENT |
      ROW PCT |
      COL PCT |  .       |YES      |NO       |  TOTAL
     ---------+---------+---------+---------+
         .    |      20 |      96 |      46 |      .
              |       . |       . |       . |      .
              |       . |       . |       . |
              |       . |       . |       . |
     ---------+---------+---------+---------+
     0-10     |       3 |       2 |       1 |      3
              |       . |    5.56 |    2.78 |   8.33
              |       . |   66.67 |   33.33 |
              |       . |    5.71 |  100.00 |
     ---------+---------+---------+---------+
     26-50    |       1 |       1 |       0 |      1
              |       . |    2.78 |    0.00 |   2.78
              |       . |  100.00 |    0.00 |
              |       . |    2.86 |    0.00 |
     ---------+---------+---------+---------+
     51-100   |       0 |       4 |       0 |      4
              |       . |   11.11 |    0.00 |  11.11
              |       . |  100.00 |    0.00 |
              |       . |   11.43 |    0.00 |
     ---------+---------+---------+---------+
     >100     |       1 |      28 |       0 |     28
              |       . |   77.78 |    0.00 |  77.78
              |       . |  100.00 |    0.00 |
              |       . |   80.00 |    0.00 |
     ---------+---------+---------+---------+
     TOTAL            .        35         1       36
                      .     97.22      2.78   100.00
```

Science Masters Degrees Awarded

Table 421. Number and percent of institutions awarding various numbers of masters degrees in science, by institutions providing access to a computer for science faculty or students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                TABLE OF SCIMS BY UNDAC

SCIMS     NUM SCIENCE MASTER DEGREES 74-79   UNDAC      COMPUTERS A

FREQUENCY| Science Undergraduates Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |        .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |      64 |      87 |      11 |       .
         |       . |       . |       . |       .
         |       . |       . |       . |
         |       . |       . |       . |
---------+--------+--------+--------+
0-10     |       3 |       2 |       1 |       3
         |       . |    5.88 |    2.94 |    8.82
         |       . |   66.67 |   33.33 |
         |       . |    6.25 |   50.00 |
---------+--------+--------+--------+
26-50    |       1 |       1 |       0 |       1
         |       . |    2.94 |    0.00 |    2.94
         |       . |  100.00 |    0.00 |
         |       . |    3.13 |    0.00 |
---------+--------+--------+--------+
51-100   |       0 |       4 |       0 |       4
         |       . |   11.76 |    0.00 |   11.76
         |       . |  100.00 |    0.00 |
         |       . |   12.50 |    0.00 |
---------+--------+--------+--------+
>100     |       3 |      25 |       1 |      26
         |       . |   73.53 |    2.94 |   76.47
         |       . |   96.15 |    3.85 |
         |       . |   78.13 |   50.00 |
---------+--------+--------+--------+
TOTAL            .       32         2       34
                 .    94.12      5.88   100.00
```

Science Masters Degrees Awarded

Table 422. Number and percent of institutions awarding various numbers of masters degrees in science, by institutions providing access to a computer for science undergraduates, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                     TABLE OF SCIMS BY GRADAC

SCIMS     NUM SCIENCE MASTER DEGREES 74-79   GRADAC    COMPUTERS AVAILA

FREQUENCY| Science Graduate Students Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|YES     |NO      |NOT APPL|  TOTAL
---------+--------+--------+--------+--------+
      .  |    125 |     19 |     17 |      1 |      .
         |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |
         |      . |      . |      . |      . |
---------+--------+--------+--------+--------+
0-10     |      5 |      1 |      0 |      0 |      1
         |      . |   3.23 |      . |      . |   3.23
         |      . | 100.00 |      . |      . |
         |      . |   3.23 |      . |      . |
---------+--------+--------+--------+--------+
26-50    |      1 |      1 |      0 |      0 |      1
         |      . |   3.23 |      . |      . |   3.23
         |      . | 100.00 |      . |      . |
         |      . |   3.23 |      . |      . |
---------+--------+--------+--------+--------+
51-100   |      0 |      4 |      0 |      0 |      4
         |      . |  12.90 |      . |      . |  12.90
         |      . | 100.00 |      . |      . |
         |      . |  12.90 |      . |      . |
---------+--------+--------+--------+--------+
>100     |      4 |     25 |      0 |      0 |     25
         |      . |  80.65 |      . |      . |  80.65
         |      . | 100.00 |      . |      . |
         |      . |  80.65 |      . |      . |
---------+--------+--------+--------+--------+
TOTAL           .       31        .        .       31
                .   100.00        .        .   100.00
```

Science Masters Degrees Awarded

Table 423 . Number and percent of institutions awarding various numbers of masters degrees in science, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF SCIMS BY ACCFAC

SCIMS     NUM SCIENCE MASTER DEGREES 74-79     ACCFAC     COMP FACILI

FREQUENCY|  Science Faculty Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  | .       |YES     |NO      |  TOTAL
---------+---------+--------+--------+
    .    |      65 |     90 |      7 |     .
         |       . |      . |      . |     .
         |       . |      . |      . |
         |       . |      . |      . |
---------+---------+--------+--------+
0-10     |       3 |      2 |      1 |      3
         |       . |   5.56 |   2.78 |   8.33
         |       . |  66.67 |  33.33 |
         |       . |   5.71 | 100.00 |
---------+---------+--------+--------+
26-50    |       1 |      1 |      0 |      1
         |       . |   2.78 |   0.00 |   2.78
         |       . | 100.00 |   0.00 |
         |       . |   2.86 |   0.00 |
---------+---------+--------+--------+
51-100   |       0 |      4 |      0 |      4
         |       . |  11.11 |   0.00 |  11.11
         |       . | 100.00 |   0.00 |
         |       . |  11.43 |   0.00 |
---------+---------+--------+--------+
>100     |       1 |     28 |      0 |     28
         |       . |  77.78 |   0.00 |  77.78
         |       . | 100.00 |   0.00 |
         |       . |  80.00 |   0.00 |
---------+---------+--------+--------+
TOTAL            .       35        1       36
                 .    97.22     2.78   100.00
```

Science Masters Degrees Awarded

Table 424. Number and percent of institutions awarding various numbers of masters degrees in science, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF SCIMS BY CAMPCOMP

          SCIMS     NUM SCIENCE MASTER DEGREES 74-79   CAMPCOMP  IS COMPUTER

          FREQUENCY| Computer is Located on Campus
          PERCENT  |
          ROW PCT  |
          COL PCT  |        |YES     |NO      |
                   |   .    |        |        |  TOTAL
          ---------+--------+--------+--------+
               .   |     11 |     42 |     15 |      .
                   |      . |      . |      . |      .
                   |      . |      . |      . |
                   |      . |      . |      . |
          ---------+--------+--------+--------+
          0-10     |      2 |      2 |      0 |      2
                   |      . |  15.38 |      . |  15.38
                   |      . | 100.00 |      . |
                   |      . |  15.38 |      . |
          ---------+--------+--------+--------+
          26-50    |      0 |      2 |      0 |      2
                   |      . |  15.38 |      . |  15.38
                   |      . | 100.00 |      . |
                   |      . |  15.38 |      . |
          ---------+--------+--------+--------+
          51-100   |      0 |      2 |      0 |      2
                   |      . |  15.38 |      . |  15.38
                   |      . | 100.00 |      . |
                   |      . |  15.38 |      . |
          ---------+--------+--------+--------+
          >100     |      0 |      7 |      0 |      7
                   |      . |  53.85 |      . |  53.85
                   |      . | 100.00 |      . |
                   |      . |  53.85 |      . |
          ---------+--------+--------+--------+
          TOTAL           .       13        .       13
                          .   100.00        .   100.00
```

Science Masters Degrees Awarded

Table 425. Number and percent of institutions awarding various numbers of masters degrees in science, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF SCID BY INACOMP

SCID      NUMBER SCIENCE DOCTORATES 74-79   INACOMP   DOES INSTI

FREQUENCY| Institution Has Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |   .    |YES     |NO      |  TOTAL
---------+--------+--------+--------+
       .  |      1 |     65 |     10 |      .
          |      . |      . |      . |      .
          |      . |      . |      . |
          |      . |      . |      . |
---------+--------+--------+--------+
0-10      |      0 |      4 |      2 |      6
          |      . |  57.14 |  28.57 |  85.71
          |      . |  66.67 |  33.33 |
          |      . |  80.00 | 100.00 |
---------+--------+--------+--------+
26-50     |      0 |      1 |      0 |      1
          |      . |  14.29 |   0.00 |  14.29
          |      . | 100.00 |   0.00 |
          |      . |  20.00 |   0.00 |
---------+--------+--------+--------+
TOTAL            .        5        2        7
                 .    71.43    28.57   100.00
```

Science Doctorate Degrees Awarded

Table 426. Number and percent of institutions awarding various numbers of doctorate degrees in science, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF SCID BY COMPAC

SCID        NUMBER SCIENCE DOCTORATES 74-79    COMPAC    FACULTY-STUDE

FREQUENCY| Science Faculty or Students Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |   .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
      .  |      21 |     117 |      46 |      .
         |       . |       . |       . |      .
         |       . |       . |       . |
         |       . |       . |       . |
---------+--------+--------+--------+
0-10     |       3 |      14 |       1 |     15
         |       . |   93.33 |    6.67 | 100.00
         |       . |   93.33 |    6.67 |
         |       . |  100.00 |  100.00 |
---------+--------+--------+--------+
26-50    |       1 |       0 |       0 |      0
         |       . |       . |       . |   0.00
         |       . |       . |       . |
         |       . |       . |       . |
---------+--------+--------+--------+
TOTAL            .       14        1       15
                 .    93.33     6.67   100.00
```

Science Doctorate Degrees Awarded

Table 427. Number and percent of institutions awarding various numbers of doctorate degrees in science, by institutions providing access of a computer for science faculty or students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF SCID BY UNDAC

SCID       NUMBER SCIENCE DOCTORATES 74-79   UNDAC     COMPUTERS AVA
```

Science Undergraduates Have Access to a Computer

Science Doctorate Degrees Awarded

```
FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
.        |      65|     107|      12|      .
         |       .|       .|       .|      .
         |       .|       .|       .|
         |       .|       .|       .|
---------+--------+--------+--------+
0-10     |       5|      12|       1|     13
         |       .|   92.31|    7.69|  100.00
         |       .|   92.31|    7.69|
         |       .|  100.00|  100.00|
---------+--------+--------+--------+
26-50    |       1|       0|       0|      0
         |       .|       .|       .|    0.00
         |       .|       .|       .|
         |       .|       .|       .|
---------+--------+--------+--------+
TOTAL            .      12        1      13
                 .   92.31     7.69  100.00
```

Table 428. Number and percent of institutions awarding various numbers of doctorate degrees in science, by institutions providing access to a computer for science undergraduates, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Science Graduate Students Have Access to a Computer

Science Doctorate Degrees Awarded

```
   S T A T I S T I C A L   A N A L Y S I S   S Y S T E M          21:39 WEDNESD

                         TABLE OF SCID BY GRADAC

      SCID      NUMBER SCIENCE DOCTORATES 74-79   GRADAC    COMPUTERS AVAILABL

      FREQUENCY|
       PERCENT |
       ROW PCT |
       COL PCT |       .|YES     |NO      |NOT APPL|  TOTAL
      ---------+--------+--------+--------+--------+
           .   |    129 |     37 |     17 |      1 |      .
               |      . |      . |      . |      . |      .
               |      . |      . |      . |      . |
               |      . |      . |      . |      . |
      ---------+--------+--------+--------+--------+
      0-10     |      5 |     13 |      0 |      0 |     13
               |      . | 100.00 |      . |      . | 100.00
               |      . | 100.00 |      . |      . |
               |      . | 100.00 |      . |      . |
      ---------+--------+--------+--------+--------+
      26-50    |      1 |      0 |      0 |      0 |      0
               |      . |      . |      . |      . |   0.00
               |      . |      . |      . |      . |
               |      . |      . |      . |      . |
      ---------+--------+--------+--------+--------+
      TOTAL           .       13        .        .       13
                      .   100.00        .        .   100.00
```

Table429 . Number and percent of institutions awarding various numbers of doctorate degrees in science, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF SCID BY ACCFAC

SCID        NUMBER SCIENCE DOCTORATES 74-79    ACCFAC     COMP FACILITI

FREQUENCY|  Science Faculty Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |      66|     111|       7|       .
         |       .|       .|       .|       .
         |       .|       .|       .|
         |       .|       .|       .|
---------+--------+--------+--------+
0-10     |       3|      14|       1|      15
         |       .|   93.33|    6.67|  100.00
         |       .|   93.33|    6.67|
         |       .|  100.00|  100.00|
---------+--------+--------+--------+
26-50    |       1|       0|       0|       0
         |       .|       .|       .|    0.00
         |       .|       .|       .|
         |       .|       .|       .|
---------+--------+--------+--------+
TOTAL            .       14        1      15
                 .    93.33     6.67  100.00
```

Science Doctorate Degrees Awarded

Table 430. Number and percent of institutions awarding various numbers of doctorate degrees in science, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF SCID BY CAMPCOMP

SCID      NUMBER SCIENCE DOCTORATES 74-79   CAMPCOMP  IS COMPUTER O

FREQUENCY|  Computer is Located on Campus
PERCENT  |
ROW PCT  |
COL PCT  |        |YES     |NO      |
         |   .    |        |        |  TOTAL
---------+--------+--------+--------+
    .    |     11 |     50 |     15 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-10     |      2 |      4 |      0 |      4
         |      . |  80.00 |      . |  80.00
         |      . | 100.00 |      . |
         |      . |  80.00 |      . |
---------+--------+--------+--------+
26-50    |      0 |      1 |      0 |      1
         |      . |  20.00 |      . |  20.00
         |      . | 100.00 |      . |
         |      . |  20.00 |      . |
---------+--------+--------+--------+
TOTAL           .        5        .        5
                .   100.00        .   100.00
```

Science Doctorate Degrees Awarded

Table 431. Number and percent of institutions awarding various numbers of doctorate degrees in science, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
              TABLE OF SOTH1 BY INACOMP

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79   INACOMP   DOES INS
```

Institution Has Access to a Computer

Other Science Degrees Awarded

```
FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |   .    |YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |      0 |     64 |     10 |      .
         |      . |      . |      . |
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-50     |      1 |      6 |      2 |      8
         |      . |  75.00 |  25.00 | 100.00
         |      . |  75.00 |  25.00 |
         |      . | 100.00 | 100.00 |
---------+--------+--------+--------+
TOTAL           .        6        2        8
                .    75.00    25.00   100.00
```

Table 432. Number and percent of institutions awarding various numbers of other degrees in science, by institutions having access to a computer, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF SOTH1 BY COMPAC

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79    COMPAC     FACULTY-

FREQUENCY|  Science Faculty or Students Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |   .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |     22 |    124 |     46 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-50     |      3 |      7 |      1 |      8
         |      . |  87.50 |  12.50 | 100.00
         |      . |  87.50 |  12.50 |
         |      . | 100.00 | 100.00 |
---------+--------+--------+--------+
TOTAL           .        7        1        8
                .    87.50    12.50   100.00
```

Other Science Degrees Awarded

Table 433. Number and percent of institutions awarding various numbers of other degrees in science, by institutions providing access to a computer for science faculty or students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    TABLE OF SOTH1 BY UNDAC

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79   UNDAC     COMPUTER

FREQUENCY| Science Undergraduates Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |        .|YES      |NO       |  TOTAL
---------+---------+---------+---------+
       . |      67 |     112 |      13 |      .
         |       . |       . |       . |      .
         |       . |       . |       . |
         |       . |       . |       . |
---------+---------+---------+---------+
0-50     |       4 |       7 |       0 |      7
         |       . | 100.00  |       . | 100.00
         |       . | 100.00  |       . |
         |       . | 100.00  |       . |
---------+---------+---------+---------+
TOTAL            .         7         .        7
                 .    100.00         .   100.00
```

Other Science Degrees Awarded

Table 434. Number and percent of institutions awarding various numbers of other degrees in science, by institutions providing access to a computer for science undergraduates, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF SOTH1 BY GRADAC

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79   GRADAC    COMPUTERS AVA

FREQUENCY| Science Graduate Students Have Access to a Computer
PERCENT  |
ROW PCT  |
COL PCT  |        .|YES     |NO      |NOT APPL|  TOTAL
---------+--------+--------+--------+--------+
       . |     130 |      46 |      15 |       1 |      .
         |       . |       . |       . |       . |      .
         |       . |       . |       . |       . |
         |       . |       . |       . |       . |
---------+--------+--------+--------+--------+
0-50     |       5 |       4 |       2 |       0 |      6
         |       . |   66.67 |   33.33 |       . | 100.00
         |       . |   66.67 |   33.33 |       . |
         |       . |  100.00 |  100.00 |       . |
---------+--------+--------+--------+--------+
TOTAL            .        4        2        .        6
                 .    66.67    33.33        .   100.00
```

Other Science Degrees Awarded

Table 435. Number and percent of institutions awarding various numbers of other degrees in science, by institutions providing access to a computer for science graduate students, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                   TABLE OF SOTH1 BY ACCFAC

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79   ACCFAC    COMP FAC

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |  .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |     66 |    118 |      8 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-50     |      4 |      7 |      0 |      7
         |      . | 100.00 |      . | 100.00
         |      . | 100.00 |      . |
         |      . | 100.00 |      . |
---------+--------+--------+--------+
TOTAL           .        7        .        7
                .   100.00        .   100.00
```

Science Faculty Have Access to a Computer

Other Science Degrees Awarded

Table 536. Number and percent of institutions awarding various numbers of other degrees in science, by institutions providing access to a computer for science faculty, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
TABLE OF SOTH1 BY CAMPCOMP

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79   CAMPCOMP  IS COMPUT

FREQUENCY|  Computer is Located on Campus
PERCENT  |
ROW PCT  |
COL PCT  |        |YES     |NO      |
         |      . |        |        |  TOTAL
---------+--------+--------+--------+
       . |     10 |     51 |     13 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-50     |      3 |      4 |      2 |      6
         |      . |  66.67 |  33.33 | 100.00
         |      . |  66.67 |  33.33 |
         |      . | 100.00 | 100.00 |
---------+--------+--------+--------+
TOTAL           .        4        2        6
                .    66.67    33.33   100.00
```

Other Science Degrees Awarded

Table 437. Number and percent of institutions awarding various numbers of other degrees in science, by institutions having a computer located on campus, as reported by 83 academic vice presidents or deans in minority higher education institutions.

capabilities of science students who were currently enrolled during the 1978-79 academic year, and 3) the computing skills and capabilities of faculty employed in their departments. These relationships are summarized in Figures 8 through 10, and are described in greated detail in Tables 438 through 497.

Relationships between the productivity of minority institutions in awarding science degrees and the reported computing capability and skills of students newly enrolled in the science departments of those institutions are summarized in Figure 8. From this summary, the following conclusions appear to be supported: The percentage of newly-enrolled science students reported to have no computer training or skills is not consistently related to an institution's production of associate degrees in science or masters degrees in science. The percentage is slightly smaller in institutions that award more science bachelors degrees. Relationships to production of science doctoral degrees or other science degrees are indeterminate because of small sample sizes. This is true not only for this analysis, but for all others that concern the computing skills and capabilities of newly-enrolled science students.

The percentage of newly-enrolled science students reported to have general awareness of computers is slightly lower in institutions that award more science masters degrees; otherwise it is unrelated to science degree productivity.

The percentage of newly-enrolled students reported to have limited personal computer use and skill is slightly lower in institutions that award more associate degrees in science, is moderately lower in institutions that award more science masters degrees, and is otherwise unrelated to an institution's science degree productivity.

The percentage of newly-enrolled students reported to be able to program a computer is slightly higher in institutions that award more associate degrees in science, is moderately lower in institutions that award more bachelors

Degrees Awarded (Productivity)	Percent of Newly Enrolled Science Students with Computing Skills at Various Levels			
	No Computer Training or Skills	General Awareness of Computers	Limited Personal Computer Use/Skill	Ability to Program a Computer
Science Associate Degrees	Table 438. No consistent relationship. Contingency coeff. = 0.52	Table 439. No consistent relationship. Contingency coeff. = 0.53	Table 440. Slight negative relationship. Contingency coeff. = 0.33	Table 441. Slight positive relationship. Contingency coeff. - 0.45
Science Bachelors Degrees	Table 450. Slight negative relationship. Contingency coeff. = 0.57	Table 451. No consistent relationship. Contingency coeff. = 0.50	Table 452. No consistent relationship. Contingency coeff. = 0.35	Table 453. Modest negative relationship. Contingency coeff. = 0.42
Science Masters Degrees	Table 462. No consistent relationship. Contingency coeff. = 0.49	Table 463. Slight negative relationship. Contingency coeff. = 0.63	Table 464. Moderate negative relationship. Contingency coeff. = 0.39	Table 465. Slight positive relationship. Contingency coeff. = 0.27
Science Doctoral Degrees	Table 474. Indeterminate due to small sample size.	Table 478. Indeterminate due to small sample size.	Table 479. Indeterminate due to small sample size.	Table 480. Indeterminate due to small sample size.
Other Science Degrees	Table 486. Indeterminate due to small sample size.	Table 487. Indeterminate due to small sample size.	Table 488. Indeterminate due to small sample size.	Table 489. Indeterminate due to small sample size.

Figure 8. Summary of relationships between the degree productivity of minority higher education institutions and percent of newly entering students in the sciences with computing skills at various levels, as reported by 83 academic vice presidents or deans and 178 heads of science departments.

degrees in science, and is slightly higher in institutions that award more masters degrees in science.

Viewing the relationships summarized in Figure 8 collectively, it appears that productivity of science degrees at any level is not consistently related to the percentage of newly-enrolled science students with reported computing skills at any level -- ranging from no skills at all to the ability to program a computer.

Figure 9 contains a summary of relationships between the reported computing skills of science students currently enrolled in minority institutions during the 1978-79 academic year, and the number of science degree graduates produced by those institutions during the five academic years 1973-74 through 1978-79. These relationships are readily described: The reported percentages of currently-enrolled science students who can program a computer are slightly higher in institutions that award more bachelors degrees in science. In institutions that award more masters degrees in the sciences, there appears to be a slightly higher percentage of currently-enrolled science students with no computing skills, and slightly lower percentages of currently-enrolled science students with general awareness of computers, with limited personal computing use and skill, and with the ability to program a computer. Otherwise, percentages of currently-enrolled science students with computing skills at various levels appear to be unrelated to the numbers of science degrees produced by the institutions these students attend. Note that we could not determine whether or not the level of computing skills of currently-enrolled science students was related to the science degree productivity of their institutions at the doctoral level, or in awarding "other science degrees," because sample sizes were too small.

A summary of relationships between the reported computing skills of faculty in the sciences and the science degree productivity of minority higher

Degrees Awarded (Productivity)	Percent of Currently Enrolled Science Students with Computing Skills At Various Levels			
	No Computer Training of Skills	General Awareness of Computers	Limited Personal Computer Use/Skill	Ability to Program a Computer
Science Associate Degrees	Table 442. No consistent relationship. Contingency coeff. = 0.59	Table 443. No consistent relationship. Contingency coeff. = 0.60	Table 444. No consistent relationship. Contingency coeff. = 0.68	Table 445. No consistent relationship. Contingency coeff. = 0.52
Science Bachelors Degrees	Table 454. No consistent relationship. Contingency coeff. = 0.49	Table 455. No consistent relationship. Contingency coeff. = 0.59	Table 456. No consistent relationship. Contingency coeff. = 0.56	Table 457. Slight positive relationship. Contingency coeff. = 0.59
Science Masters Degrees	Table 466. Slight positive relationship. Contingency coeff. = 0.46	Table 467. Slight negative relationship. Contingency coeff. = 0.54	Table 468. Slight negative relationship. Contingency coeff. = 0.39	Table 469. Slight negative relationship. Contingency coeff. = 0.48
Science Doctoral Degrees	Table 478. Indeterminate due to small sample size.	Table 479. Indeterminate due to small sample size.	Table 480. Indeterminate due to small sample size.	Table 481. Indeterminate due to small sample size.
Other Science Degrees	Table 490. Indeterminate due to small sample size.	Table 491. Indeterminate due to small sample size.	Table 492. Indeterminate due to small sample size.	Table 493. Indeterminate due to small sample size.

Figure 9. Summary of relationships between the degree productivity of minority higher education institutions and percent of currently enrolled students in the sciences with computing skills at various levels, as reported by 83 academic vice presidents or deans and 178 heads of science departments.

education institutions is contained in Figure 10. In institutions that award more associate degrees in science, there is no trend to have more or fewer science faculty with no computer training or skills, general awareness of computers, or limited personal computer use or skill. However, slightly fewer science faculty are reported to have the ability to program a computer if they are employed in such institutions.

Institutions that award more science bachelors degrees are reported to have slightly fewer science faculty with no computer training or skills and slightly more science faculty with the ability to program a computer. The percentage of science faculty with computing skills at other levels appears to be unrelated to this variable.

Institutions that award more masters degrees in the sciences are reported to have slightly higher percentages of science faculty with general awareness of computers and very slightly higher percentages of science faculty who can program a computer. There appears to be no consistent relationship between an institution's production of science masters degrees and the percentage of its science faculty with no computer training or skills or the percentage of its science faculty with limited personal computer use or skill.

Limitations of sample size preclude the examination of relationships between minority institutions' production of science doctoral degrees or their production of "other science degrees" and the computing skills of their science faculty.

O. Relationships between Science Degree Productivity and Science Faculty Use of Computers

In this section we examine relationships between the productivity of minority higher education institutions in awarding degrees in the sciences and the reports of science department heads on the percentages of science faculty

Degrees Awarded (Productivity)	Percent of Faculty in Science Departments with Computing Skills at Various Levels			
	No Computer Training of Skills	General Awareness of Computers	Limited Personal Computer Use/Skill	Ability to Program a Computer
Science Associate Degrees	Table 446. No consistent relationship. Contingency coeff. = 0.53	Table 447. No consistent relationship. Contingency coeff. = 0.58	Table 448. No consistent relationship. Contingency coeff. = 0.65	Table 449. Slight negative relationship. Contingency coeff. = 0.56
Science Bachelors Degrees	Table 458. Slight negative relationship. Contingency coeff. = 0.53	Table 459. No consistent relationship. Contingency coeff. = 0.55	Table 460. No consistent relationship. Contingency coeff. = 0.39	Table 461. Slight positive relationship. Contingency coeff. = 0.48
Science Masters Degrees	Table 470. No consistent relationship. Contingency coeff. = 0.42	Table 471. Slight positive relationship. Contingency coeff. = 0.41	Table 472. No consistent relationship. Contingency coeff. = 0.47	Table 473. Very slight positive relationship. Contingency coeff. = 0.52
Science Doctoral Degrees	Table 482. Indeterminate due to small sample size.	Table 483. Indeterminate due to small sample size.	Table 484. Indeterminate due to small sample size.	Table 485. Indeterminate due to small sample size.
Other Science Degrees	Table 494. Indeterminate due to small sample size.	Table 495. Indeterminate due to small sample size.	Table 496. Indeterminate due to small sample size.	Table 497. Indeterminate due to small sample size.

Figure 10. Summary of relationships between the degree productivity of minority higher education institutions and percent of faculty in science departments with computing skills at various levels, as reported by 83 academic vice presidents and 178 heads of science departments.

```
                         TABLE OF SCIAA BY NEWSKL1

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79   NEWSKL1   PERC NEW STUD NO COMPUTER SKILLS

FREQUENCY| Percent of Newly Entering Students with no Computer Training or Skills
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     44 |     15 |     15 |      7 |      4 |     15 |     32 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |     23 |      1 |      3 |      2 |      1 |      0 |      6 |     13
         |      . |   2.56 |   7.69 |   5.13 |   2.56 |   0.00 |  15.38 |  33.33
         |      . |   7.69 |  23.08 |  15.38 |   7.69 |   0.00 |  46.15 |
         |      . |  50.00 |  50.00 |  50.00 |  20.00 |   0.00 |  31.58 |
---------+--------+--------+--------+--------+--------+--------+--------+
31-100   |      3 |      0 |      0 |      0 |      0 |      0 |      2 |      2
         |      . |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |   5.13 |   5.13
         |      . |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 | 100.00 |
         |      . |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |  10.53 |
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      1 |      0 |      1 |      2 |      1 |      2 |      6 |     12
         |      . |   0.00 |   2.56 |   5.13 |   2.56 |   5.13 |  15.38 |  30.77
         |      . |   0.00 |   8.33 |  16.67 |   8.33 |  16.67 |  50.00 |
         |      . |   0.00 |  16.67 |  50.00 |  20.00 |  66.67 |  31.58 |
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |      3 |      1 |      1 |      0 |      3 |      1 |      3 |      9
         |      . |   2.56 |   2.56 |   0.00 |   7.69 |   2.56 |   7.69 |  23.08
         |      . |  11.11 |  11.11 |   0.00 |  33.33 |  11.11 |  33.33 |
         |      . |  50.00 |  16.67 |   0.00 |  60.00 |  33.33 |  15.79 |
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      2 |      0 |      1 |      0 |      0 |      0 |      2 |      3
         |      . |   0.00 |   2.56 |   0.00 |   0.00 |   0.00 |   5.13 |   7.69
         |      . |   0.00 |  33.33 |   0.00 |   0.00 |   0.00 |  66.67 |
         |      . |   0.00 |  16.67 |   0.00 |   0.00 |   0.00 |  10.53 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        2        6        4        5        3       19       39
                .     5.13    15.38    10.26    12.82     7.69    48.72   100.00
```

Science Associate Degrees Awarded

Table 438. Number and percent of institutions awarding various numbers of associate degrees in science by institutions with various percents of newly entering students with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                       S T A T I S T I C A L   A N A L Y S I S   S Y S T E M                      21:39 WEDNESDAY, SEPTEMBER

                                         TABLE OF SCIAA BY NEWSKL2

     SCIAA      NUM SCIENCE ASSOCIATE DEGREES 74-79     NEWSKL2    PERC NEW STUD GENL AWARE OF COMPUTERS

     FREQUENCY| Percent of Newly Entering Students with General Awareness of Computers
     PERCENT  |
     ROW PCT  |
     COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
     ---------+--------+--------+--------+--------+--------+--------+--------+
             .|      44|      20|      28|      10|       6|       7|      17|     .
              |       .|       .|       .|       .|       .|       .|       .|     .
              |       .|       .|       .|       .|       .|       .|       .|
              |       .|       .|       .|       .|       .|       .|       .|
     ---------+--------+--------+--------+--------+--------+--------+--------+
     0-50     |      23|       2|       4|       0|       4|       1|       2|    13
              |       .|    5.13|   10.26|    0.00|   10.26|    2.56|    5.13|  33.33
              |       .|   15.38|   30.77|    0.00|   30.77|    7.69|   15.38|
              |       .|   33.33|   22.22|    0.00|   57.14|   33.33|   66.67|
     ---------+--------+--------+--------+--------+--------+--------+--------+
     51-100   |       3|       0|       2|       0|       0|       0|       0|     2
              |       .|    0.00|    5.13|    0.00|    0.00|    0.00|    0.00|   5.13
              |       .|    0.00|  100.00|    0.00|    0.00|    0.00|    0.00|
              |       .|    0.00|   11.11|    0.00|    0.00|    0.00|    0.00|
     ---------+--------+--------+--------+--------+--------+--------+--------+
     101-250  |       1|       2|       6|       1|       1|       2|       0|    12
              |       .|    5.13|   15.38|    2.56|    2.56|    5.13|    0.00|  30.77
              |       .|   16.67|   50.00|    8.33|    8.33|   16.67|    0.00|
              |       .|   33.33|   33.33|   50.00|   14.29|   66.67|    0.00|
     ---------+--------+--------+--------+--------+--------+--------+--------+
     251-500  |       3|       1|       5|       1|       2|       0|       0|     9
              |       .|    2.56|   12.82|    2.56|    5.13|    0.00|    0.00|  23.08
              |       .|   11.11|   55.56|   11.11|   22.22|    0.00|    0.00|
              |       .|   16.67|   27.78|   50.00|   28.57|    0.00|    0.00|
     ---------+--------+--------+--------+--------+--------+--------+--------+
     >1000    |       2|       1|       1|       0|       0|       0|       1|     3
              |       .|    2.56|    2.56|    0.00|    0.00|    0.00|    2.56|   7.69
              |       .|   33.33|   33.33|    0.00|    0.00|    0.00|   33.33|
              |       .|   16.67|    5.56|    0.00|    0.00|    0.00|   33.33|
     ---------+--------+--------+--------+--------+--------+--------+--------+
     TOTAL            .        6       18        2        7        3        3      39
                      .    15.38    46.15     5.13    17.95     7.69     7.69  100.00
```

Science Associate Degrees Awarded

Table 439. Number and percent of institutions awarding various numbers of associate degrees in science by institutions with various percents of newly entering students with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

783

784

```
                         TABLE OF SCIAA BY NEWSKL3

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79    NEWSKL3    PE

FREQUENCY| Percent of Newly Entering Students with Limited Personal
PERCENT  |                Computer Use and Skill
ROW PCT  |
COL PCT  |        .|        0|1%-20%  |21%-40% |  TOTAL
---------+---------+---------+---------+---------+
       . |      44 |      38 |      42 |       8 |       .
         |       . |       . |       . |       . |       .
         |       . |       . |       . |       . |
         |       . |       . |       . |       . |
---------+---------+---------+---------+---------+
0-50     |      23 |       3 |       8 |       2 |      13
         |       . |    7.69 |   20.51 |    5.13 |   33.33
         |       . |   23.08 |   61.54 |   15.38 |
         |       . |   20.00 |   38.10 |   66.67 |
---------+---------+---------+---------+---------+
51-100   |       3 |       1 |       1 |       0 |       2
         |       . |    2.56 |    2.56 |    0.00 |    5.13
         |       . |   50.00 |   50.00 |    0.00 |
         |       . |    6.67 |    4.76 |    0.00 |
---------+---------+---------+---------+---------+
101-250  |       1 |       5 |       7 |       0 |      12
         |       . |   12.82 |   17.95 |    0.00 |   30.77
         |       . |   41.67 |   58.33 |    0.00 |
         |       . |   33.33 |   33.33 |    0.00 |
---------+---------+---------+---------+---------+
251-500  |       3 |       4 |       4 |       1 |       9
         |       . |   10.26 |   10.26 |    2.56 |   23.08
         |       . |   44.44 |   44.44 |   11.11 |
         |       . |   26.67 |   19.05 |   33.33 |
---------+---------+---------+---------+---------+
>1000    |       2 |       2 |       1 |       0 |       3
         |       . |    5.13 |    2.56 |    0.00 |    7.69
         |       . |   66.67 |   33.33 |    0.00 |
         |       . |   13.33 |    4.76 |    0.00 |
---------+---------+---------+---------+---------+
TOTAL            .        15        21         3       39
                 .     38.46     53.85      7.69   100.00
```

Science Associate Degrees Awarded

Table 440. Number and percent of institutions awarding various numbers of associate degrees in science by institutions with various percents of newly entering students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans in minority higher education institutions, and 178 heads of science departments in minority higher education institutions.

```
                   S T A T I S T I C A L   A N A L Y S I S   S Y S T E M                21:39 WE

                                  TABLE OF SCIAA BY NEWSKL4

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79    NEWSKL4    PERC NEW STUD WHO

FREQUENCY|  Percent of Newly Entering Students with Ability to Program a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+
       . |      44|      56|      29|       2|       1|       0|       .
         |       .|       .|       .|       .|       .|       .|       .
         |       .|       .|       .|       .|       .|       .|
         |       .|       .|       .|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+
0-50     |      23|       8|       5|       0|       0|       0|      13
         |       .|   20.51|   12.82|       .|       .|    0.00|   33.33
         |       .|   61.54|   38.46|       .|       .|    0.00|
         |       .|   44.44|   25.00|       .|       .|    0.00|
---------+--------+--------+--------+--------+--------+--------+
51-100   |       3|       2|       0|       0|       0|       0|       2
         |       .|    5.13|    0.00|       .|       .|    0.00|    5.13
         |       .|  100.00|    0.00|       .|       .|    0.00|
         |       .|   11.11|    0.00|       .|       .|    0.00|
---------+--------+--------+--------+--------+--------+--------+
101-250  |       1|       4|       8|       0|       0|       0|      12
         |       .|   10.26|   20.51|       .|       .|    0.00|   30.77
         |       .|   33.33|   66.67|       .|       .|    0.00|
         |       .|   22.22|   40.00|       .|       .|    0.00|
---------+--------+--------+--------+--------+--------+--------+
251-500  |       3|       2|       6|       0|       0|       1|       9
         |       .|    5.13|   15.38|       .|       .|    2.56|   23.08
         |       .|   22.22|   66.67|       .|       .|   11.11|
         |       .|   11.11|   30.00|       .|       .|  100.00|
---------+--------+--------+--------+--------+--------+--------+
>1000    |       2|       2|       1|       0|       0|       0|       3
         |       .|    5.13|    2.56|       .|       .|    0.00|    7.69
         |       .|   66.67|   33.33|       .|       .|    0.00|
         |       .|   11.11|    5.00|       .|       .|    0.00|
---------+--------+--------+--------+--------+--------+--------+
TOTAL           .       18       20        .        .        1       39
                .    46.15    51.28        .        .     2.56   100.00
```

Science Associate Degrees Awarded

Table 441. Number and percent of institutions awarding various numbers of associate degrees in science by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF SCIAA BY OLDSKL1

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79   OLDSKL1   PERC CURRENT STUD NO COMPUTER SKILLS

FREQUENCY| Percent of Currently Enrolled Students with no Computer Training or Skills
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     43 |     28 |     18 |      9 |      9 |     13 |     12 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |     23 |      3 |      3 |      4 |      1 |      1 |      1 |     13
         |      . |   7.50 |   7.50 |  10.00 |   2.50 |   2.50 |   2.50 |  32.50
         |      . |  23.08 |  23.08 |  30.77 |   7.69 |   7.69 |   7.69 |
         |      . |  50.00 |  33.33 |  33.33 |  33.33 |  50.00 |  12.50 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      3 |      0 |      0 |      0 |      0 |      1 |      1 |      2
         |      . |   0.00 |   0.00 |   0.00 |   0.00 |   2.50 |   2.50 |   5.00
         |      . |   0.00 |   0.00 |   0.00 |   0.00 |  50.00 |  50.00 |
         |      . |   0.00 |   0.00 |   0.00 |   0.00 |  50.00 |  12.50 |
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      1 |      1 |      1 |      4 |      1 |      0 |      5 |     12
         |      . |   2.50 |   2.50 |  10.00 |   2.50 |   0.00 |  12.50 |  30.00
         |      . |   8.33 |   8.33 |  33.33 |   8.33 |   0.00 |  41.67 |
         |      . |  16.67 |  11.11 |  33.33 |  33.33 |   0.00 |  62.50 |
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |      2 |      1 |      4 |      3 |      1 |      0 |      1 |     10
         |      . |   2.50 |  10.00 |   7.50 |   2.50 |   0.00 |   2.50 |  25.00
         |      . |  10.00 |  40.00 |  30.00 |  10.00 |   0.00 |  10.00 |
         |      . |  16.67 |  44.44 |  25.00 |  33.33 |   0.00 |  12.50 |
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      2 |      1 |      1 |      1 |      0 |      0 |      0 |      3
         |      . |   2.50 |   2.50 |   2.50 |   0.00 |   0.00 |   0.00 |   7.50
         |      . |  33.33 |  33.33 |  33.33 |   0.00 |   0.00 |   0.00 |
         |      . |  16.67 |  11.11 |   8.33 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        6        9       12        3        2        8       40
                .    15.00    22.50    30.00     7.50     5.00    20.00   100.00
```

Science Associate Degrees Awarded

Table 442. Number and percent of institutions awarding various numbers of associate degrees in science by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

TABLE OF SCIAA BY OLDSKL2

SCIAA   NUM SCIENCE ASSOCIATE DEGREES 74-79   OLDSKL2   PERC CURRENT STUD GENL AWARE COMPUTERS

Science Associate Degrees Awarded

```
FREQUENCY| Percent of Currently Enrolled Students with General Awareness of Computers
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |      43|      16|      34|      20|       7|       7|       5|      .
         |       .|       .|       .|       .|       .|       .|       .|      .
         |       .|       .|       .|       .|       .|       .|       .|
         |       .|       .|       .|       .|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |      23|       4|       3|       2|       0|       4|       0|     13
         |       .|   10.00|    7.50|    5.00|    0.00|   10.00|       .|  32.50
         |       .|   30.77|   23.08|   15.38|    0.00|   30.77|       .|
         |       .|   50.00|   23.08|   25.00|    0.00|  100.00|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |       3|       0|       2|       0|       0|       0|       0|      2
         |       .|    0.00|    5.00|    0.00|    0.00|    0.00|       .|   5.00
         |       .|    0.00|  100.00|    0.00|    0.00|    0.00|       .|
         |       .|    0.00|   15.38|    0.00|    0.00|    0.00|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |       1|       2|       5|       2|       3|       0|       0|     12
         |       .|    5.00|   12.50|    5.00|    7.50|    0.00|       .|  30.00
         |       .|   16.67|   41.67|   16.67|   25.00|    0.00|       .|
         |       .|   25.00|   38.46|   25.00|   42.86|    0.00|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |       2|       1|       2|       3|       4|       0|       0|     10
         |       .|    2.50|    5.00|    7.50|   10.00|    0.00|       .|  25.00
         |       .|   10.00|   20.00|   30.00|   40.00|    0.00|       .|
         |       .|   12.50|   15.38|   37.50|   57.14|    0.00|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |       2|       1|       1|       1|       0|       0|       0|      3
         |       .|    2.50|    2.50|    2.50|    0.00|    0.00|       .|   7.50
         |       .|   33.33|   33.33|   33.33|    0.00|    0.00|       .|
         |       .|   12.50|    7.69|   12.50|    0.00|    0.00|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL            .        8       13        8        7        4        .      40
                 .    20.00    32.50    20.00    17.50    10.00        .  100.00
```

Table 443. Number and percent of institutions awarding various numbers of associate degrees in science by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF SCIAA BY OLDSKL3

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79   OLDSKL3   PERC CURRENT STUD LIMITED COMPUTER USE

FREQUENCY| Percent of Currently Enrolled Students with Limited Personal Computer Use or Skill
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     43 |     18 |     47 |     14 |      6 |      1 |      3 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |     23 |      2 |      8 |      2 |      1 |      0 |      0 |     13
         |      . |   5.00 |  20.00 |   5.00 |   2.50 |      . |   0.00 |  32.50
         |      . |  15.38 |  61.54 |  15.38 |   7.69 |      . |   0.00 |
         |      . |  25.00 |  32.00 |  66.67 |  33.33 |      . |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      3 |      1 |      1 |      0 |      0 |      0 |      0 |      2
         |      . |   2.50 |   2.50 |   0.00 |   0.00 |      . |   0.00 |   5.00
         |      . |  50.00 |  50.00 |   0.00 |   0.00 |      . |   0.00 |
         |      . |  12.50 |   4.00 |   0.00 |   0.00 |      . |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      1 |      3 |      9 |      0 |      0 |      0 |      0 |     12
         |      . |   7.50 |  22.50 |   0.00 |   0.00 |      . |   0.00 |  30.00
         |      . |  25.00 |  75.00 |   0.00 |   0.00 |      . |   0.00 |
         |      . |  37.50 |  36.00 |   0.00 |   0.00 |      . |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |      2 |      2 |      7 |      1 |      0 |      0 |      0 |     10
         |      . |   5.00 |  17.50 |   2.50 |   0.00 |      . |   0.00 |  25.00
         |      . |  20.00 |  70.00 |  10.00 |   0.00 |      . |   0.00 |
         |      . |  25.00 |  28.00 |  33.33 |   0.00 |      . |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      2 |      0 |      0 |      0 |      2 |      0 |      1 |      3
         |      . |   0.00 |   0.00 |   0.00 |   5.00 |      . |   2.50 |   7.50
         |      . |   0.00 |   0.00 |   0.00 |  66.67 |      . |  33.33 |
         |      . |   0.00 |   0.00 |   0.00 |  66.67 |      . | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        8       25        3        3        .        1       40
                .    20.00    62.50     7.50     7.50        .     2.50   100.00
```

Science Associate Degrees Awarded

Table 444. Number and percent of institutions awarding various numbers of associate degrees in science by institutions with various percents of currently enrolled students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                                   TABLE OF SCIAA BY OLDSKL4

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79    OLDSKL4   PERC CURRENT STUD WHO CAN PROGRAM COMP

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     43 |     27 |     34 |     12 |     11 |      2 |      3 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |     23 |      2 |      6 |      3 |      0 |      1 |      1 |     13
         |      . |   5.00 |  15.00 |   7.50 |      . |   2.50 |   2.50 |  32.50
         |      . |  15.38 |  46.15 |  23.08 |      . |   7.69 |   7.69 |
         |      . |  28.57 |  25.00 |  75.00 |      . |  33.33 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      3 |      1 |      1 |      0 |      0 |      0 |      0 |      2
         |      . |   2.50 |   2.50 |   0.00 |      . |   0.00 |   0.00 |   5.00
         |      . |  50.00 |  50.00 |   0.00 |      . |   0.00 |   0.00 |
         |      . |  14.29 |   4.17 |   0.00 |      . |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      1 |      2 |      9 |      0 |      0 |      1 |      0 |     12
         |      . |   5.00 |  22.50 |   0.00 |      . |   2.50 |   0.00 |  30.00
         |      . |  16.67 |  75.00 |   0.00 |      . |   8.33 |   0.00 |
         |      . |  28.57 |  37.50 |   0.00 |      . |  33.33 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |      2 |      0 |      7 |      1 |      0 |      1 |      1 |     10
         |      . |   0.00 |  17.50 |   2.50 |      . |   2.50 |   2.50 |  25.00
         |      . |   0.00 |  70.00 |  10.00 |      . |  10.00 |  10.00 |
         |      . |   0.00 |  29.17 |  25.00 |      . |  33.33 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      2 |      2 |      1 |      0 |      0 |      0 |      0 |      3
         |      . |   5.00 |   2.50 |   0.00 |      . |   0.00 |   0.00 |   7.50
         |      . |  66.67 |  33.33 |   0.00 |      . |   0.00 |   0.00 |
         |      . |  28.57 |   4.17 |   0.00 |      . |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        7       24        4        .        3        2       40
                .    17.50    60.00    10.00        .     7.50     5.00   100.00
```

Percent of Currently Enrolled Students with Ability to Program a Computer

Science Associate Degrees Awarded

Table 445. Number and percent of institutions awarding various numbers of associate degrees in science by institutions with various percents of currently enrolled students with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF SCIAA BY FACSKL1

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79   FACSKL1   PERCENT FACULTY NO COMPUTER SKILLS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     41 |     57 |     12 |     11 |      5 |      4 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |     23 |      9 |      2 |      0 |      1 |      0 |      1 |     13
         |      . |  22.50 |   5.00 |   0.00 |   2.50 |   0.00 |   2.50 |  32.50
         |      . |  69.23 |  15.38 |   0.00 |   7.69 |   0.00 |   7.69 |
         |      . |  36.00 |  40.00 |   0.00 |  33.33 |   0.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      3 |      1 |      0 |      0 |      1 |      0 |      0 |      2
         |      . |   2.50 |   0.00 |   0.00 |   2.50 |   0.00 |   0.00 |   5.00
         |      . |  50.00 |   0.00 |   0.00 |  50.00 |   0.00 |   0.00 |
         |      . |   4.00 |   0.00 |   0.00 |  33.33 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      1 |      7 |      2 |      1 |      0 |      1 |      1 |     12
         |      . |  17.50 |   5.00 |   2.50 |   0.00 |   2.50 |   2.50 |  30.00
         |      . |  58.33 |  16.67 |   8.33 |   0.00 |   8.33 |   8.33 |
         |      . |  28.00 |  40.00 |  33.33 |   0.00 |  50.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |      2 |      6 |      0 |      2 |      1 |      1 |      0 |     10
         |      . |  15.00 |   0.00 |   5.00 |   2.50 |   2.50 |   0.00 |  25.00
         |      . |  60.00 |   0.00 |  20.00 |  10.00 |  10.00 |   0.00 |
         |      . |  24.00 |   0.00 |  66.67 |  33.33 |  50.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      2 |      2 |      1 |      0 |      0 |      0 |      0 |      3
         |      . |   5.00 |   2.50 |   0.00 |   0.00 |   0.00 |   0.00 |   7.50
         |      . |  66.67 |  33.33 |   0.00 |   0.00 |   0.00 |   0.00 |
         |      . |   8.00 |  20.00 |   0.00 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       25        5        3        3        2        2       40
                .    62.50    12.50     7.50     7.50     5.00     5.00   100.00
```

Percent of Faculty with No Computer Training or Skills

Science Associate Degrees Awarded

Table 446. Number and percent of institutions awarding various numbers of associate degrees in science by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

TABLE OF SCIAA BY CSKL2

SCIAA NUM SCIENCE ASSOCIATE DEGREES 74-79 FACSKL2 PERC FACULTY GENL AWARE OF COMPUTERS

Percent of Faculty with General Awareness of Computers

Science Associate Degrees Awarded

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	41 . . .	26 . . .	13 . . .	26 . . .	13 . . .	10 . . .	3 . . .	. .
0-50	23 . . .	4 10.00 30.77 44.44	6 15.00 46.15 40.00	1 2.50 7.69 16.67	1 2.50 7.69 16.67	1 2.50 7.69 25.00	0 . . .	13 32.50
51-100	3 . . .	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 5.00 100.00 33.33	0 0.00 0.00 0.00	0 . . .	2 5.00
101-250	1 . . .	2 5.00 16.67 22.22	5 12.50 41.67 33.33	2 5.00 16.67 33.33	1 2.50 8.33 16.67	2 5.00 16.67 50.00	0 . . .	12 30.00
251-500	2 . . .	1 2.50 10.00 11.11	4 10.00 40.00 26.67	2 5.00 20.00 33.33	2 5.00 20.00 33.33	1 2.50 10.00 25.00	0 . . .	10 25.00
>1000	2 . . .	2 5.00 66.67 22.22	0 0.00 0.00 0.00	1 2.50 33.33 16.67	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 . . .	3 7.50
TOTAL	. .	9 22.50	15 37.50	6 15.00	6 15.00	4 10.00	. .	40 100.00

Table 447. Number and percent of institutions awarding various numbers of associate degrees in science by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                          STATISTICAL ANALYSIS SYSTEM
                                                                   21:39 WEDNESDAY, SEPTEMBE

                                  TABLE OF SCIAA BY FACSKL3

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79   FACSKL3   PERC FACULTY LIMITED COMPUTER USE-SKILL

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     41 |     15 |     39 |     23 |     10 |      2 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |     23 |      3 |      5 |      1 |      3 |      1 |      0 |     13
         |      . |   7.50 |  12.50 |   2.50 |   7.50 |   2.50 |   0.00 |  32.50
         |      . |  23.08 |  38.46 |   7.69 |  23.08 |   7.69 |   0.00 |
         |      . |  27.27 |  35.71 |  16.67 |  50.00 |  50.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      3 |      2 |      0 |      0 |      0 |      0 |      0 |      2
         |      . |   5.00 |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |   5.00
         |      . | 100.00 |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |
         |      . |  18.18 |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      1 |      3 |      5 |      3 |      1 |      0 |      0 |     12
         |      . |   7.50 |  12.50 |   7.50 |   2.50 |   0.00 |   0.00 |  30.00
         |      . |  25.00 |  41.67 |  25.00 |   8.33 |   0.00 |   0.00 |
         |      . |  27.27 |  35.71 |  50.00 |  16.67 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |      2 |      3 |      4 |      2 |      1 |      0 |      0 |     10
         |      . |   7.50 |  10.00 |   5.00 |   2.50 |   0.00 |   0.00 |  25.00
         |      . |  30.00 |  40.00 |  20.00 |  10.00 |   0.00 |   0.00 |
         |      . |  27.27 |  28.57 |  33.33 |  16.67 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      2 |      0 |      0 |      0 |      1 |      1 |      1 |      3
         |      . |   0.00 |   0.00 |   0.00 |   2.50 |   2.50 |   2.50 |   7.50
         |      . |   0.00 |   0.00 |   0.00 |  33.33 |  33.33 |  33.33 |
         |      . |   0.00 |   0.00 |   0.00 |  16.67 |  50.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       11       14        6        6        2        1       40
                .    27.50    35.00    15.00    15.00     5.00     2.50   100.00
```

Percent of Faculty with Limited Personal Computer Use and Skill

Science Associate Degrees Awarded

Table 448. Number and percent of institutions awarding various numbers of associate degrees in science by institutions with various percents of faculty with limited computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF SCIAA BY FACSKL4

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79    FACSKL4   PERC FACULTY WHO CAN PROGRAM COMPUTER

FREQUENCY|       Percent of Faculty with Ability to Program a Computer
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     41 |     14 |     28 |     18 |     14 |      6 |     11 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |     23 |      2 |      3 |      2 |      2 |      1 |      3 |     13
         |      . |   5.00 |   7.50 |   5.00 |   5.00 |   2.50 |   7.50 |  32.50
         |      . |  15.38 |  23.08 |  15.38 |  15.38 |   7.69 |  23.08 |
         |      . |  40.00 |  33.33 |  14.29 |  50.00 | 100.00 |  42.86 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      3 |      1 |      0 |      0 |      1 |      0 |      0 |      2
         |      . |   2.50 |   0.00 |   0.00 |   2.50 |   0.00 |   0.00 |   5.00
         |      . |  50.00 |   0.00 |   0.00 |  50.00 |   0.00 |   0.00 |
         |      . |  20.00 |   0.00 |   0.00 |  25.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      1 |      1 |      3 |      5 |      1 |      0 |      2 |     12
         |      . |   2.50 |   7.50 |  12.50 |   2.50 |   0.00 |   5.00 |  30.00
         |      . |   8.33 |  25.00 |  41.67 |   8.33 |   0.00 |  16.67 |
         |      . |  20.00 |  33.33 |  35.71 |  25.00 |   0.00 |  28.57 |
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |      2 |      0 |      3 |      5 |      0 |      0 |      2 |     10
         |      . |   0.00 |   7.50 |  12.50 |   0.00 |   0.00 |   5.00 |  25.00
         |      . |   0.00 |  30.00 |  50.00 |   0.00 |   0.00 |  20.00 |
         |      . |   0.00 |  33.33 |  35.71 |   0.00 |   0.00 |  28.57 |
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      2 |      1 |      0 |      2 |      0 |      0 |      0 |      3
         |      . |   2.50 |   0.00 |   5.00 |   0.00 |   0.00 |   0.00 |   7.50
         |      . |  33.33 |   0.00 |  66.67 |   0.00 |   0.00 |   0.00 |
         |      . |  20.00 |   0.00 |  14.29 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        5        9       14        4        1        7       40
                .    12.50    22.50    35.00    10.00     2.50    17.50   100.00
```

Science Associate Degrees Awarded

Table 449. Number and percent of institutions awarding various numbers of associate degrees in science by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF SCIBS BY NEWSKL1

SCIBS     NUM SCIENCE BACHELOR DEGREES 74-79   NEWSKL1   PERC NEW STUD NO COMPUTER SKILLS

FREQUENCY| Percent of Newly Entering Students with no Computer Training or Skills
 PERCENT |
 ROW PCT |
 COL PCT |       .|        0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     49 |      5 |      9 |      6 |      6 |      7 |     30 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |      9 |      0 |      1 |      1 |      0 |      1 |      3 |      6
         |      . |   0.00 |   1.56 |   1.56 |   0.00 |   1.56 |   4.69 |   9.38
         |      . |   0.00 |  16.67 |  16.67 |   0.00 |  16.67 |  50.00 |
         |      . |   0.00 |   8.33 |  20.00 |   0.00 |   9.09 |  14.29 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      2 |      1 |      0 |      0 |      0 |      0 |      0 |      1
         |      . |   1.56 |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |   1.56
         |      . | 100.00 |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |
         |      . |   8.33 |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      6 |      0 |      3 |      0 |      1 |      0 |      2 |      6
         |      . |   0.00 |   4.69 |   0.00 |   1.56 |   0.00 |   3.13 |   9.38
         |      . |   0.00 |  50.00 |   0.00 |  16.67 |   0.00 |  33.33 |
         |      . |   0.00 |  25.00 |   0.00 |  33.33 |   0.00 |   9.52 |
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |      5 |      2 |      0 |      2 |      0 |      3 |      9 |     16
         |      . |   3.13 |   0.00 |   3.13 |   0.00 |   4.69 |  14.06 |  25.00
         |      . |  12.50 |   0.00 |  12.50 |   0.00 |  18.75 |  56.25 |
         |      . |  16.67 |   0.00 |  40.00 |   0.00 |  27.27 |  42.86 |
---------+--------+--------+--------+--------+--------+--------+--------+
501-1000 |      1 |      6 |      4 |      2 |      0 |      3 |      3 |     18
         |      . |   9.38 |   6.25 |   3.13 |   0.00 |   4.69 |   4.69 |  28.13
         |      . |  33.33 |  22.22 |  11.11 |   0.00 |  16.67 |  16.67 |
         |      . |  50.00 |  33.33 |  40.00 |   0.00 |  27.27 |  14.29 |
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      4 |      3 |      4 |      0 |      2 |      4 |      4 |     17
         |      . |   4.69 |   6.25 |   0.00 |   3.13 |   6.25 |   6.25 |  26.56
         |      . |  17.65 |  23.53 |   0.00 |  11.76 |  23.53 |  23.53 |
         |      . |  25.00 |  33.33 |   0.00 |  66.67 |  36.36 |  19.05 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       12       12        5        3       11       21       64
                .    18.75    18.75     7.81     4.69    17.19    32.81   100.00
```

Science Bachelors Degrees Awarded

-582-

803

804

Table /50 Number and percent of institutions awarding various numbers of bachelors degrees

Science Bachelors Degrees Awarded

```
                                 TABLE OF SCIBS BY NEWSKL2

SCIBS     NUM SCIENCE BACHELOR DEGREES 74-79   NEWSKL2   PERC NEW STUD GENL AWARE OF COMPUTERS

FREQUENCY| Percent of Newly Entering Students with General Awareness of Computers
PERCENT  |
ROW PCT  |
COL PCT  |       .|        0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+---------+--------+--------+--------+--------+--------+
       . |     49 |      14 |     24 |      5 |      6 |      5 |      9 |     .
         |      . |       . |      . |      . |      . |      . |      . |     .
         |      . |       . |      . |      . |      . |      . |      . |
         |      . |       . |      . |      . |      . |      . |      . |
---------+--------+---------+--------+--------+--------+--------+--------+
0-50     |      9 |       1 |      3 |      0 |      2 |      0 |      0 |     6
         |      . |    1.56 |   4.69 |   0.00 |   3.13 |   0.00 |   0.00 |  9.38
         |      . |   16.67 |  50.00 |   0.00 |  33.33 |   0.00 |   0.00 |
         |      . |    8.33 |  13.64 |   0.00 |  28.57 |   0.00 |   0.00 |
---------+--------+---------+--------+--------+--------+--------+--------+
51-100   |      2 |       0 |      0 |      0 |      0 |      0 |      1 |     1
         |      . |    0.00 |   0.00 |   0.00 |   0.00 |   0.00 |   1.56 |  1.56
         |      . |    0.00 |   0.00 |   0.00 |   0.00 |   0.00 | 100.00 |
         |      . |    0.00 |   0.00 |   0.00 |   0.00 |   0.00 |   9.09 |
---------+--------+---------+--------+--------+--------+--------+--------+
101-250  |      6 |       2 |      0 |      0 |      1 |      1 |      2 |     6
         |      . |    3.13 |   0.00 |   0.00 |   1.56 |   1.56 |   3.13 |  9.38
         |      . |   33.33 |   0.00 |   0.00 |  16.67 |  16.67 |  33.33 |
         |      . |   16.67 |   0.00 |   0.00 |  14.29 |  20.00 |  18.18 |
---------+--------+---------+--------+--------+--------+--------+--------+
251-500  |      5 |       3 |      8 |      2 |      1 |      1 |      1 |    16
         |      . |    4.69 |  12.50 |   3.13 |   1.56 |   1.56 |   1.56 | 25.00
         |      . |   18.75 |  50.00 |  12.50 |   6.25 |   6.25 |   6.25 |
         |      . |   25.00 |  36.36 |  28.57 |  14.29 |  20.00 |   9.09 |
---------+--------+---------+--------+--------+--------+--------+--------+
501-1000 |      1 |       2 |      5 |      3 |      1 |      2 |      5 |    18
         |      . |    3.13 |   7.81 |   4.69 |   1.56 |   3.13 |   7.81 | 28.13
         |      . |   11.11 |  27.78 |  16.67 |   5.56 |  11.11 |  27.78 |
         |      . |   16.67 |  22.73 |  42.86 |  14.29 |  40.00 |  45.45 |
---------+--------+---------+--------+--------+--------+--------+--------+
>1000    |      4 |       4 |      6 |      2 |      2 |      1 |      2 |    17
         |      . |    6.25 |   9.38 |   3.13 |   3.13 |   1.56 |   3.13 | 26.56
         |      . |   23.53 |  35.29 |  11.76 |  11.76 |   5.88 |  11.76 |
         |      . |   33.33 |  27.27 |  28.57 |  28.57 |  20.00 |  18.18 |
---------+--------+---------+--------+--------+--------+--------+--------+
TOTAL           .        12       22        7        7        5       11       64
                .     18.75    34.38    10.94    10.94     7.81    17.19   100.00
```

805

806

Table 451. Number and percent of institutions awarding various numbers of bachelors degrees

```
                         TABLE OF SCIBS BY NEWSKL3

SCIBS      NUM SCIENCE BACHELOR DEGREES 74-79    NEWSKL3    PERC N

FREQUENCY| Percent of Newly Entering Students with Limited
PERCENT  |
ROW PCT  |          Personal Use and Skill
COL PCT  |        .|       0|1%-20%  |21%-40%  |  TOTAL
---------+---------+---------+---------+---------+
       . |      49 |      29 |      32 |       2 |      .
         |       . |       . |       . |       . |      .
         |       . |       . |       . |       . |
         |       . |       . |       . |       . |
---------+---------+---------+---------+---------+
0-50     |       9 |       3 |       2 |       1 |      6
         |       . |    4.69 |    3.13 |    1.56 |   9.38
         |       . |   50.00 |   33.33 |   16.67 |
         |       . |   12.50 |    6.45 |   11.11 |
---------+---------+---------+---------+---------+
51-100   |       2 |       1 |       0 |       0 |      1
         |       . |    1.56 |    0.00 |    0.00 |   1.56
         |       . |  100.00 |    0.00 |    0.00 |
         |       . |    4.17 |    0.00 |    0.00 |
---------+---------+---------+---------+---------+
101-250  |       6 |       4 |       2 |       0 |      6
         |       . |    6.25 |    3.13 |    0.00 |   9.38
         |       . |   66.67 |   33.33 |    0.00 |
         |       . |   16.67 |    6.45 |    0.00 |
---------+---------+---------+---------+---------+
251-500  |       5 |       7 |       7 |       2 |     16
         |       . |   10.94 |   10.94 |    3.13 |  25.00
         |       . |   43.75 |   43.75 |   12.50 |
         |       . |   29.17 |   22.58 |   22.22 |
---------+---------+---------+---------+---------+
501-1000 |       1 |       3 |      11 |       4 |     18
         |       . |    4.69 |   17.19 |    6.25 |  28.13
         |       . |   16.67 |   61.11 |   22.22 |
         |       . |   12.50 |   35.48 |   44.44 |
---------+---------+---------+---------+---------+
>1000    |       4 |       6 |       9 |       2 |     17
         |       . |    9.38 |   14.06 |    3.13 |  26.56
         |       . |   35.29 |   52.94 |   11.76 |
         |       . |   25.00 |   29.03 |   22.22 |
---------+---------+---------+---------+---------+
TOTAL            .        24        31         9       64
                 .     37.50     48.44     14.06   100.00
```

Science Bachelors Degrees Awarded

Table 452. Number and percent of institutions awarding various numbers of bachelors degrees in science by institutions with various percents of newly entering students with limited computer use and skill, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

807

Science Bachelors Degrees Awarded

.	49	38	25	0	0	0	.
	.	.	.	.	.	.	.
	.	.	.	.	.	.	
	.	.	.	.	.	.	
0-50	9	4	2	0	0	0	6
	.	6.25	3.13	0.00	0.00	0.00	9.38
	.	66.67	33.33	0.00	0.00	0.00	
	.	11.11	8.33	0.00	0.00	0.00	
51-100	2	1	0	0	0	0	1
	.	1.56	0.00	0.00	0.00	0.00	1.56
	.	100.00	0.00	0.00	0.00	0.00	
	.	2.78	0.00	0.00	0.00	0.00	
101-250	6	5	1	0	0	0	6
	.	7.81	1.56	0.00	0.00	0.00	9.38
	.	83.33	16.67	0.00	0.00	0.00	
	.	13.89	4.17	0.00	0.00	0.00	
251-500	5	12	4	0	0	0	16
	.	18.75	6.25	0.00	0.00	0.00	25.00
	.	75.00	25.00	0.00	0.00	0.00	
	.	33.33	16.67	0.00	0.00	0.00	
501-1000	1	7	9	1	1	0	18
	.	10.94	14.06	1.56	1.56	0.00	28.13
	.	38.89	50.00	5.56	5.56	0.00	
	.	19.44	37.50	50.00	100.00	0.00	
>1000	4	7	8	1	0	1	17
	.	10.94	12.50	1.56	0.00	1.56	26.56
	.	41.18	47.06	5.88	0.00	5.88	
	.	19.44	33.33	50.00	0.00	100.00	
TOTAL	.	36	24	2	1	1	64
	.	56.25	37.50	3.13	1.56	1.56	100.00

Table 453. Number and percent of institutions awarding various numbers of bachelors degrees in science by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Science Bachelors Degrees Awarded

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Currently Enrolled Students with No Computer Training or Skills .	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	49 . . .	13 . . .	11 . . .	11 . . .	6 . . .	8 . . .	14 . . .	. .
0-50	9 . . .	0 0.00 0.00 0.00	1 1.52 16.67 6.25	1 1.52 16.67 10.00	2 3.03 33.33 33.33	2 3.03 33.33 28.57	0 0.00 0.00 0.00	6 9.09
51-100	2 . . .	1 1.52 100.00 4.76	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.52
101-250	6 . . .	2 3.03 33.33 9.52	2 3.03 33.33 12.50	1 1.52 16.67 10.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.52 16.67 16.67	6 9.09
251-500	5 . . .	5 7.58 31.25 23.81	2 3.03 12.50 12.50	2 3.03 12.50 20.00	2 3.03 12.50 33.33	2 3.03 12.50 28.57	3 4.55 18.75 50.00	16 24.24
501-1000	1 . . .	7 10.61 38.89 33.33	5 7.58 27.78 31.25	2 3.03 11.11 20.00	2 3.03 11.11 33.33	1 1.52 5.56 14.29	1 1.52 5.56 16.67	18 27.27
>1000	2 . . .	6 9.09 31.58 28.57	6 9.09 31.58 37.50	4 6.06 21.05 40.00	0 0.00 0.00 0.00	2 3.03 10.53 28.57	1 1.52 5.26 16.67	19 28.79
TOTAL	. .	21 31.82	16 24.24	10 15.15	6 9.09	7 10.61	6 9.09	66 100.00

Table 454. Number and percent of institutions awarding various numbers of bachelors degrees in science by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Science Bachelors Degrees Awarded

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Currently Enrolled Students with General Awareness of Computers							
	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	49	14	25	10	7	6	1	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	9	1	2	3	0	0	0	6
	.	1.52	3.03	4.55	0.00	0.00	0.00	9.09
	.	16.67	33.33	50.00	0.00	0.00	0.00	
	.	10.00	9.09	16.67	0.00	0.00	0.00	
51-100	2	0	0	0	0	0	1	1
	.	0.00	0.00	0.00	0.00	0.00	1.52	1.52
	.	0.00	0.00	0.00	0.00	0.00	100.00	
	.	0.00	0.00	0.00	0.00	0.00	25.00	
101-250	6	0	2	2	1	0	1	6
	.	0.00	3.03	3.03	1.52	0.00	1.52	9.09
	.	0.00	33.33	33.33	16.67	0.00	16.67	
	.	0.00	9.09	11.11	14.29	0.00	25.00	
251-500	5	3	7	5	1	0	0	16
	.	4.55	10.61	7.58	1.52	0.00	0.00	24.24
	.	18.75	43.75	31.25	6.25	0.00	0.00	
	.	30.00	31.82	27.78	14.29	0.00	0.00	
501-1000	1	1	8	4	1	2	2	18
	.	1.52	12.12	6.06	1.52	3.03	3.03	27.27
	.	5.56	44.44	22.22	5.56	11.11	11.11	
	.	10.00	36.36	22.22	14.29	40.00	50.00	
>1000	2	5	3	4	4	3	0	19
	.	7.58	4.55	6.06	6.06	4.55	0.00	28.79
	.	26.32	15.79	21.05	21.05	15.79	0.00	
	.	50.00	13.64	22.22	57.14	60.00	0.00	
TOTAL	.	10	22	18	7	5	4	66
	.	15.15	33.33	27.27	10.61	7.58	6.06	100.00

Table 455. Number and percent of institutions awarding various numbers of bachelors degrees in science by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Currently Enrolled Students with Limited Personal Computer Use and Skill

Science Bachelors Degrees Awarded

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	49 . . .	17 . . .	34 . . .	3 . . .	5 . . .	1 . . .	3 . . .	. .
0-50	9 . . .	1 1.52 16.67 11.11	3 4.55 50.00 7.89	2 3.03 33.33 14.29	0 0.00 0.00 0.00	0 . . .	0 0.00 0.00 0.00	6 9.09
51-100	2 . . .	1 1.52 100.00 11.11	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 . . .	0 0.00 0.00 0.00	1 1.52
101-250	6 . . .	0 0.00 0.00 0.00	4 6.06 66.67 10.53	0 0.00 0.00 0.00	2 3.03 33.33 50.00	0 . . .	0 0.00 0.00 0.00	6 9.09
251-500	5 . . .	4 6.06 25.00 44.44	7 10.61 43.75 18.42	4 6.06 25.00 28.57	0 0.00 0.00 0.00	0 . . .	1 1.52 6.25 100.00	16 24.24
501-1000	1 . . .	0 0.00 0.00 0.00	12 18.18 66.67 31.58	6 9.09 33.33 42.86	0 0.00 0.00 0.00	0 . . .	0 0.00 0.00 0.00	18 27.27
>1000	2 . . .	3 4.55 15.79 33.33	12 18.18 63.16 31.58	2 3.03 10.53 14.29	2 3.03 10.53 50.00	0 . . .	0 0.00 0.00 0.00	19 28.79
TOTAL	. .	9 13.64	38 57.58	14 21.21	4 6.06	. .	1 1.52	66 100.00

Table 456 Number and percent of institutions awarding various numbers of bachelors degrees in science by institutions with various percents of currently enrolled students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Faculty with No Computer Training or Skills

Science Bachelors Degrees Awarded

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	49 . . .	41 . . .	11 . . .	4 . . .	4 . . .	2 . . .	1 . . .	. .
0-50	9 . . .	4 5.88 66.67 9.76	0 0.00 0.00 0.00	1 1.47 16.67 10.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.47 16.67 33.33	6 8.82
51-100	2 . . .	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.47 100.00 10.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.47
101-250	5 . . .	4 5.88 57.14 9.76	2 2.94 28.57 33.33	1 1.47 14.29 10.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	7 10.29
251-500	5 . . .	9 13.24 56.25 21.95	1 1.47 6.25 16.67	2 2.94 12.50 20.00	0 0.00 0.00 0.00	3 4.41 18.75 75.00	1 1.47 6.25 33.33	16 23.53
501-1000	1 . . .	13 19.12 72.22 31.71	2 2.94 11.11 33.33	1 1.47 5.56 10.00	1 1.47 5.56 25.00	0 0.00 0.00 0.00	1 1.47 5.56 33.33	18 26.47
>1000	1 . . .	11 16.18 55.00 26.83	1 1.47 5.00 16.67	4 5.88 20.00 40.00	3 4.41 15.00 75.00	1 1.47 5.00 25.00	0 0.00 0.00 0.00	20 29.41
TOTAL	. .	41 60.29	6 8.82	10 14.71	4 5.88	4 5.88	3 4.41	68 100.00

Table 458. Number and percent of institutions awarding various numbers of bachelors degrees in science by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Science Bachelors Degrees Awarded

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Currently Enrolled Students with Ability to Program a Computer							
	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	49	20	30	5	4	2	2	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	9	0	4	2	0	0	0	6
	.	0.00	6.06	3.03	0.00	0.00	0.00	9.09
	.	0.00	66.67	33.33	0.00	0.00	0.00	
	.	0.00	14.29	18.18	0.00	0.00	0.00	
51-100	2	1	0	0	0	0	0	1
	.	1.52	0.00	0.00	0.00	0.00	0.00	1.52
	.	100.00	0.00	0.00	0.00	0.00	0.00	
	.	7.14	0.00	0.00	0.00	0.00	0.00	
101-250	6	2	3	1	0	0	0	6
	.	3.03	4.55	1.52	0.00	0.00	0.00	9.09
	.	33.33	50.00	16.67	0.00	0.00	0.00	
	.	14.29	10.71	9.09	0.00	0.00	0.00	
251-500	5	7	2	4	3	0	0	16
	.	10.61	3.03	6.06	4.55	0.00	0.00	24.24
	.	43.75	12.50	25.00	18.75	0.00	0.00	
	.	50.00	7.14	36.36	42.86	0.00	0.00	
501-1000	1	1	9	2	4	2	0	18
	.	1.52	13.64	3.03	6.06	3.03	0.00	27.27
	.	5.56	50.00	11.11	22.22	11.11	0.00	
	.	7.14	32.14	18.18	57.14	66.67	0.00	
>1000	2	3	10	2	0	1	3	19
	.	4.55	15.15	3.03	0.00	1.52	4.55	28.79
	.	15.79	52.63	10.53	0.00	5.26	15.79	
	.	21.43	35.71	18.18	0.00	33.33	100.00	
TOTAL	.	14	28	11	7	3	3	66
	.	21.21	42.42	16.67	10.61	4.55	4.55	100.00

Table 457. Number and percent of institutions awarding various numbers of bachelors degrees in science by institutions with various percents of currently enrolled students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Faculty with General Awareness of Computers							
Science Bachelors Degrees Awarded	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	49 . . .	24 . . .	10 . . .	10 . . .	7 . . .	10 . . .	2 . . .	. .
0-50	9 . . .	0 0.00 0.00 0.00	2 2.94 33.33 11.11	1 1.47 16.67 4.55	2 2.94 33.33 16.67	1 1.47 16.67 25.00	0 0.00 0.00 0.00	6 8.82
51-100	2 . . .	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.47 100.00 8.33	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.47
101-250	5 . . .	0 0.00 0.00 0.00	3 4.41 42.86 16.67	2 2.94 28.57 9.09	1 1.47 14.29 8.33	0 0.00 0.00 0.00	1 1.47 14.29 100.00	7 10.29
251-500	5 . . .	4 5.88 25.00 36.36	3 4.41 18.75 16.67	8 11.76 50.00 36.36	0 0.00 0.00 0.00	1 1.47 6.25 25.00	0 0.00 0.00 0.00	16 23.53
501-1000	1 . . .	5 7.35 27.78 45.45	5 7.35 27.78 27.78	5 7.35 27.78 22.73	2 2.94 11.11 16.67	1 1.47 5.56 25.00	0 0.00 0.00 0.00	18 26.47
>1000	1 . . .	2 2.94 10.00 18.18	5 7.35 25.00 27.78	6 8.82 30.00 27.27	6 8.82 30.00 50.00	1 1.47 5.00 25.00	0 0.00 0.00 0.00	20 29.41
TOTAL	. .	11 16.18	18 26.47	22 32.35	12 17.65	4 5.88	1 1.47	68 100.00

Table 459. Number and percent of institutions awarding various numbers of bachelors degrees in science by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Faculty with Limited Personal Computer Use and Skill

Science Bachelors Degrees Awarded

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	49	17	26	7	9	1	3	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	9	0	3	2	0	1	0	6
	.	0.00	4.41	2.94	0.00	1.47	.	8.82
	.	0.00	50.00	33.33	0.00	16.67	.	
	.	0.00	11.11	9.09	0.00	33.33	.	
51-100	2	0	1	0	0	0	0	1
	.	0.00	1.47	0.00	0.00	0.00	.	1.47
	.	0.00	100.00	0.00	0.00	0.00	.	
	.	0.00	3.70	0.00	0.00	0.00	.	
101-250	5	1	2	4	0	0	0	7
	.	1.47	2.94	5.88	0.00	0.00	.	10.29
	.	14.29	28.57	57.14	0.00	0.00	.	
	.	11.11	7.41	18.18	0.00	0.00	.	
251-500	5	4	5	4	2	1	0	16
	.	5.88	7.35	5.88	2.94	1.47	.	23.53
	.	25.00	31.25	25.00	12.50	6.25	.	
	.	44.44	18.52	18.18	28.57	33.33	.	
501-1000	1	2	7	6	2	1	0	18
	.	2.94	10.29	8.82	2.94	1.47	.	26.47
	.	11.11	38.89	33.33	11.11	5.56	.	
	.	22.22	25.93	27.27	28.57	33.33	.	
>1000	1	2	9	6	3	0	0	20
	.	2.94	13.24	8.82	4.41	0.00	.	29.41
	.	10.00	45.00	30.00	15.00	0.00	.	
	.	22.22	33.33	27.27	42.86	0.00	.	
TOTAL	.	9	27	22	7	3	.	68
	.	13.24	39.71	32.35	10.29	4.41	.	100.00

Table 460 . Number and percent of institutions awarding various numbers of bachelors degrees in science by institutions with various percents of faculty with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Faculty with Ability to Program a Computer

Science Bachelors Degrees Awarded

FREQUENCY [illegible]CENT [illegible] PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	49 . . .	11 . . .	14 . . .	13 . . .	10 . . .	3 . . .	12 . . .	. .
0-50	9 . . .	1 1.47 16.67 12.50	3 4.41 50.00 13.04	2 2.94 33.33 10.53	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	6 8.82
51-100	2 . . .	1 1.47 100.00 12.50	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.47
101-250	5 . . .	1 1.47 14.29 12.50	2 2.94 28.57 8.70	2 2.94 28.57 10.53	1 1.47 14.29 12.50	1 1.47 14.29 25.00	0 0.00 0.00 0.00	7 10.29
251-500	5 . . .	3 4.41 18.75 37.50	6 8.82 37.50 26.09	2 2.94 12.50 10.53	2 2.94 12.50 25.00	0 0.00 0.00 0.00	3 4.41 18.75 50.00	16 23.53
501-1000	1 . . .	1 1.47 5.56 12.50	5 7.35 27.78 21.74	5 7.35 27.78 26.32	3 4.41 16.67 37.50	2 2.94 11.11 50.00	2 2.94 11.11 33.33	18 26.47
>1000	1 . . .	1 1.47 5.00 12.50	7 10.29 35.00 30.43	8 11.76 40.00 42.11	2 2.94 10.00 25.00	1 1.47 5.00 25.00	1 1.47 5.00 16.67	20 29.41
TOTAL	. .	8 11.76	23 33.82	19 27.94	8 11.76	4 5.88	6 8.82	68 100.00

Table 461. Number and percent of institutions awarding various numbers of bachelors degrees in science by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Newly Entering Students with No Computer Training or Skills

Science Masters Degrees Awarded

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	68	12	13	8	7	11	43	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-10	3	0	1	1	0	0	1	3
	.	0.00	3.03	3.03	0.00	0.00	3.03	9.09
	.	0.00	33.33	33.33	0.00	0.00	33.33	
	.	0.00	12.50	33.33	0.00	0.00	12.50	
26-50	1	0	1	0	0	0	0	1
	.	0.00	3.03	0.00	0.00	0.00	0.00	3.03
	.	0.00	100.00	0.00	0.00	0.00	0.00	
	.	0.00	12.50	0.00	0.00	0.00	0.00	
51-100	0	1	1	1	0	0	1	4
	.	3.03	3.03	3.03	0.00	0.00	3.03	12.12
	.	25.00	25.00	25.00	0.00	0.00	25.00	
	.	20.00	12.50	33.33	0.00	0.00	12.50	
>100	4	4	5	1	2	7	6	25
	.	12.12	15.15	3.03	6.06	21.21	18.18	75.76
	.	16.00	20.00	4.00	8.00	28.00	24.00	
	.	80.00	62.50	33.33	100.00	100.00	75.00	
TOTAL	.	5	8	3	2	7	8	33
	.	15.15	24.24	9.09	6.06	21.21	24.24	100.00

Table 462. Number and percent of institutions awarding various numbers of masters degrees in science by institutions with various percents of newly entering students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Newly Entering Students with General Awareness of Computers

Science Masters Degrees Awarded

FREQUENCY [illegible]RCENT [illegible]W PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	68	20	34	8	8	7	17	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-10	3	0	1	0	2	0	0	3
	.	0.00	3.03	0.00	6.06	0.00	0.00	9.09
	.	0.00	33.33	0.00	66.67	0.00	0.00	
	.	0.00	8.33	0.00	40.00	0.00	0.00	
26-50	1	0	0	0	0	1	0	1
	.	0.00	0.00	0.00	0.00	3.03	0.00	3.03
	.	0.00	0.00	0.00	0.00	100.00	0.00	
	.	0.00	0.00	0.00	0.00	33.33	0.00	
51-100	0	0	1	1	1	0	1	4
	.	0.00	3.03	3.03	3.03	0.00	3.03	12.12
	.	0.00	25.00	25.00	25.00	0.00	25.00	
	.	0.00	8.33	25.00	20.00	0.00	33.33	
>100	4	6	10	3	2	2	2	25
	.	18.18	30.30	9.09	6.06	6.06	6.06	75.76
	.	24.00	40.00	12.00	8.00	8.00	8.00	
	.	100.00	83.33	75.00	40.00	66.67	66.67	
TOTAL	.	6	12	4	5	3	3	33
.	.	18.18	36.36	12.12	15.15	9.09	9.09	100.00

Table 463. Number and percent of institutions awarding various numbers of masters degrees in science by institutions with various percents of newly entering students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Newly Entering Students with Limited Personal Computer Use and Skill				
Science Masters Degrees Awarded	.	0	1%-20%	21%-40%	TOTAL
.	68 . . .	46 . . .	43 . . .	5 . . .	. .
0-10	3 . . .	0 0.00 0.00 0.00	2 6.06 66.67 10.00	1 3.03 33.33 16.67	3 9.09
26-50	1 . . .	0 0.00 0.00 0.00	1 3.03 100.00 5.00	0 0.00 0.00 0.00	1 3.03
51-100	0 . . .	0 0.00 0.00 0.00	2 6.06 50.00 10.00	2 6.06 50.00 33.33	4 12.12
>100	4 . . .	7 21.21 28.00 100.00	15 45.45 60.00 75.00	3 9.09 12.00 50.00	25 75.76
TOTAL	. .	7 21.21	20 60.61	6 18.18	33 100.00

Table 464. Number and percent of institutions awarding various numbers of masters degrees in science by institutions with various percents of newly entering students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Newly Entering Students with Ability to Program a Computer

Science Masters Degrees Awarded

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	81%-100%	TOTAL
.	68 . . .	60 . . .	33 . . .	1 . . .	0 . . .	0 . . .	. .
0-10	3 . . .	2 6.06 66.67 14.29	1 3.03 33.33 6.25	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	3 9.09
26-50	1 . . .	0 0.00 0.00 0.00	1 3.03 100.00 6.25	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 3.03
51-100	0 . . .	2 6.06 50.00 14.29	2 6.06 50.00 12.50	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	4 12.12
>100	4 . . .	10 30.30 40.00 71.43	12 36.36 48.00 75.00	1 3.03 4.00 100.00	1 3.03 4.00 100.00	1 3.03 4.00 100.00	25 75.76
TOTAL	. .	14 42.42	16 48.48	1 3.03	1 3.03	1 3.03	33 100.00

Table 465. Number and percent of institutions awarding various numbers of masters degrees in science by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
Science Masters Degrees Awarded

FREQUENCY| Percent of Currently Enrolled Students with No Computer Training or Skills
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40%  |41%-60%  |61%-80%  |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     68 |     25 |     14 |     14 |     10 |     13 |     18 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      3 |      0 |      1 |      1 |      1 |      0 |      0 |      3
         |      . |   0.00 |   2.86 |   2.86 |   2.86 |   0.00 |   0.00 |   8.57
         |      . |   0.00 |  33.33 |  33.33 |  33.33 |   0.00 |   0.00 |
         |      . |   0.00 |   7.69 |  14.29 |  50.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      1 |      0 |      0 |      0 |      0 |      1
         |      . |   0.00 |   2.86 |   0.00 |   0.00 |   0.00 |   0.00 |   2.86
         |      . |   0.00 | 100.00 |   0.00 |   0.00 |   0.00 |   0.00 |
         |      . |   0.00 |   7.69 |   0.00 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      0 |      2 |      1 |      1 |      0 |      0 |      0 |      4
         |      . |   5.71 |   2.86 |   2.86 |   0.00 |   0.00 |   0.00 |  11.43
         |      . |  50.00 |  25.00 |  25.00 |   0.00 |   0.00 |   0.00 |
         |      . |  22.22 |   7.69 |  14.29 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>100     |      2 |      7 |     10 |      5 |      1 |      2 |      2 |     27
         |      . |  20.00 |  28.57 |  14.29 |   2.86 |   5.71 |   5.71 |  77.14
         |      . |  25.93 |  37.04 |  18.52 |   3.70 |   7.41 |   7.41 |
         |      . |  77.78 |  76.92 |  71.43 |  50.00 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL             .        9       13        7        2        2        2       35
                  .    25.71    37.14    20.00     5.71     5.71     5.71   100.00
```

Table 466. Number and percent of institutions awarding various numbers of masters degrees in science by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Currently Enrolled Students with General Awareness of Computers							
Science Masters Degrees Awarded	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	68 . . .	17 . . .	39 . . .	19 . . .	8 . . .	6 . . .	5 . . .	. .
0-10	3 . . .	1 2.86 33.33 14.29	0 0.00 0.00 0.00	2 5.71 66.67 22.22	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 . . .	3 8.57
26-50	1 . . .	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 2.86 100.00 16.67	0 0.00 0.00 0.00	0 . . .	1 2.86
51-100	0 . . .	0 0.00 0.00 0.00	1 2.86 25.00 12.50	1 2.86 25.00 11.11	0 0.00 0.00 0.00	2 5.71 50.00 40.00	0 . . .	4 11.43
>100	2 . . .	6 17.14 22.22 85.71	7 20.00 25.93 87.50	6 17.14 22.22 66.67	5 14.29 18.52 83.33	3 8.57 11.11 60.00	0 . . .	27 77.14
TOTAL	. .	7 20.00	8 22.86	9 25.71	6 17.14	5 14.29	. .	35 100.00

Table 467. Number and percent of institutions awarding various numbers of masters degrees in science by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                  S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                            21:39 WEDNESDAY, SEPTEMBE

                              TABLE OF SCIMS BY OLDSKL3

SCIMS     NUM SCIENCE MASTER DEGREES 74-79   OLDSKL3   PERC CURRENT STUD LIMITED COMPUTER USE

FREQUENCY| Percent of Currently Enrolled Students with Limited Personal Computer Use
PERCENT  |                              and Skill
ROW PCT  |
COL PCT  |      . |      0 |1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     68 |     23 |     49 |     10 |      7 |      1 |      4 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      3 |      0 |      1 |      2 |      0 |      0 |      0 |      3
         |      . |   0.00 |   2.86 |   5.71 |   0.00 |      . |      . |   8.57
         |      . |   0.00 |  33.33 |  66.67 |   0.00 |      . |      . |
         |      . |   0.00 |   4.35 |  28.57 |   0.00 |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      1 |      0 |      0 |      0 |      0 |      1
         |      . |   0.00 |   2.86 |   0.00 |   0.00 |      . |      . |   2.86
         |      . |   0.00 | 100.00 |   0.00 |   0.00 |      . |      . |
         |      . |   0.00 |   4.35 |   0.00 |   0.00 |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      0 |      0 |      3 |      1 |      0 |      0 |      0 |      4
         |      . |   0.00 |   8.57 |   2.86 |   0.00 |      . |      . |  11.43
         |      . |   0.00 |  75.00 |  25.00 |   0.00 |      . |      . |
         |      . |   0.00 |  13.04 |  14.29 |   0.00 |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
>100     |      2 |      3 |     18 |      4 |      2 |      0 |      0 |     27
         |      . |   8.57 |  51.43 |  11.43 |   5.71 |      . |      . |  77.14
         |      . |  11.11 |  66.67 |  14.81 |   7.41 |      . |      . |
         |      . | 100.00 |  78.26 |  57.14 | 100.00 |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        3       23        7        2        .        .       35
                .     8.57    65.71    20.00     5.71        .        .   100.00
```

Science Masters Degrees Awarded

Table 468. Number and percent of institutions awarding various numbers of masters degrees in science by institutions with various percents of currently enrolled students with limited personal computer use or skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                                TABLE OF SCIMS BY OLDSKL4

SCIMS     NUM SCIENCE MASTER DEGREES 74-79   OLDSKL4   PERC CURRENT STUD WHO CAN PROGRAM COMP

FREQUENCY| Percent of Currently Enrolled Students with Ability to Program a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     68 |     30 |     41 |     10 |      5 |      2 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      3 |      0 |      1 |      2 |      0 |      0 |      0 |      3
         |      . |   0,00 |   2.86 |   5.71 |   0,00 |   0,00 |   0,00 |   8,57
         |      . |   0,00 |  33,33 |  66,67 |   0,00 |   0,00 |   0,00 |
         |      . |   0,00 |   5.88 |  33,33 |   0,00 |   0,00 |   0,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      1 |      0 |      0 |      0 |      0 |      1
         |      . |   0,00 |   2.86 |   0,00 |   0,00 |   0,00 |   0,00 |   2,86
         |      . |   0.00 | 100.00 |   0,00 |   0,00 |   0,00 |   0,00 |
         |      . |   0,00 |   5.88 |   0,00 |   0,00 |   0,00 |   0,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      0 |      0 |      2 |      1 |      0 |      1 |      0 |      4
         |      . |   0,00 |   5.71 |   2.86 |   0,00 |   2.86 |   0,00 |  11,43
         |      . |   0,00 |  50,00 |  25,00 |   0,00 |  25,00 |   0,00 |
         |      . |   0,00 |  11,76 |  16,67 |   0,00 |  33,33 |   0,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>100     |      2 |      4 |     13 |      3 |      2 |      2 |      3 |     27
         |      . |  11,43 |  37.14 |   8,57 |   5,71 |   5,71 |   8,57 |  77,14
         |      . |  14,81 |  48.15 |  11,11 |   7.41 |   7.41 |  11,11 |
         |      . | 100,00 |  76,47 |  50,00 | 100,00 |  66,67 | 100,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        4       17        6        2        3        3       35
                .    11,43    48,57    17,14     5,71     8,57     8,57   100,00
```

Science Masters Degrees Awarded

Table 469. Number and percent of institutions awarding various numbers of masters degrees in science by institutions with various percents of currently enrolled students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF SCIMS BY FACSKL1

SCIMS     NUM SCIENCE MASTER DEGREES 74-79    FACSKL1   PERCENT FACULTY NO COMPUTER SKILLS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     67 |     60 |     15 |      8 |      5 |      5 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      3 |      2 |      0 |      0 |      0 |      0 |      1 |      3
         |      . |   5.56 |   0.00 |   0.00 |   0.00 |   0.00 |   2.78 |   8.33
         |      . |  66.67 |   0.00 |   0.00 |   0.00 |   0.00 |  33.33 |
         |      . |   9.09 |   0.00 |   0.00 |   0.00 |   0.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      1 |      0 |      0 |      0 |      0 |      0 |      1
         |      . |   2.78 |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |   2.78
         |      . | 100.00 |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |
         |      . |   4.55 |   0.00 |   0.00 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      0 |      3 |      0 |      1 |      0 |      0 |      0 |      4
         |      . |   8.33 |   0.00 |   2.78 |   0.00 |   0.00 |   0.00 |  11.11
         |      . |  75.00 |   0.00 |  25.00 |   0.00 |   0.00 |   0.00 |
         |      . |  13.64 |   0.00 |  16.67 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>100     |      1 |     16 |      2 |      5 |      3 |      1 |      1 |     28
         |      . |  44.44 |   5.56 |  13.89 |   8.33 |   2.78 |   2.78 |  77.78
         |      . |  57.14 |   7.14 |  17.86 |  10.71 |   3.57 |   3.57 |
         |      . |  72.73 | 100.00 |  83.33 | 100.00 | 100.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       22        2        6        3        1        2       36
                .    61.11     5.56    16.67     8.33     2.78     5.56   100.00
```

Percent of Faculty with No Computer Training or Skills

Science Masters Degrees Awarded

Table 470. Number and percent of institutions awarding various numbers of masters degrees in science by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Faculty with General Awareness of Computers

Science Masters Degrees Awarded

```
                              TABLE OF SCIMS BY FACSKL2

SCIMS •   NUM SCIENCE MASTER DEGREES 74-79   FACSKL2   PERC FACULTY GENL AWARE OF COMPUTERS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
      .  |     67 |     31 |     15 |     23 |     11 |     12 |      3 |       .
         |      . |      . |      . |      . |      . |      . |      . |       .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      3 |      0 |      2 |      0 |      1 |      0 |      0 |       3
         |      . |   0.00 |   5.56 |   0.00 |   2.78 |   0.00 |      . |    8.33
         |      . |   0.00 |  66.67 |   0.00 |  33.33 |   0.00 |      . |
         |      . |   0.00 |  15.38 |   0.00 |  12.50 |   0.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      1 |      0 |      0 |      0 |      0 |       1
         |      . |   0.00 |   2.78 |   0.00 |   0.00 |   0.00 |      . |    2.78
         |      . |   0.00 | 100.00 |   0.00 |   0.00 |   0.00 |      . |
         |      . |   0.00 |   7.69 |   0.00 |   0.00 |   0.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      0 |      1 |      1 |      2 |      0 |      0 |      0 |       4
         |      . |   2.78 |   2.78 |   5.56 |   0.00 |   0.00 |      . |   11.11
         |      . |  25.00 |  25.00 |  50.00 |   0.00 |   0.00 |      . |
         |      . |  25.00 |   7.69 |  22.22 |   0.00 |   0.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
>100     |      1 |      3 |      9 |      7 |      7 |      2 |      0 |      28
         |      . |   8.33 |  25.00 |  19.44 |  19.44 |   5.56 |      . |   77.78
         |      . |  10.71 |  32.14 |  25.00 |  25.00 |   7.14 |      . |
         |      . |  75.00 |  69.23 |  77.78 |  87.50 | 100.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        4       13        9        8        2        .       36
                .    11.11    36.11    25.00    22.22     5.56        .   100.00
```

Table 471. Number and percent of institutions awarding various numbers of masters degrees in science by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                        S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                        21:39 WEDNESDAY, SEPTEM

                                      TABLE OF SCIMS BY FACSKL3

      SCIMS      NUM SCIENCE MASTER DEGREES 74-79    FACSKL3   PERC FACULTY LIMITED COMPUTER USE-SKILL

      FREQUENCY|     Percent of Faculty with Limited Personal Computer Use and Skill
      PERCENT  |
      ROW PCT  |
      COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
      ---------+--------+--------+--------+--------+--------+--------+--------+
           .   |     67 |     23 |     37 |     18 |     12 |      2 |      3 |      .
               |      . |      . |      . |      . |      . |      . |      . |      .
               |      . |      . |      . |      . |      . |      . |      . |
               |      . |      . |      . |      . |      . |      . |      . |
      ---------+--------+--------+--------+--------+--------+--------+--------+
      0-10     |      3 |      0 |      1 |      1 |      0 |      1 |      0 |      3
               |      . |   0.00 |   2.78 |   2.78 |   0.00 |   2.78 |      . |   8.33
               |      . |   0.00 |  33.33 |  33.33 |   0.00 |  33.33 |      . |
               |      . |   0.00 |   6.25 |   9.09 |   0.00 |  50.00 |      . |
      ---------+--------+--------+--------+--------+--------+--------+--------+
      26-50    |      1 |      0 |      0 |      1 |      0 |      0 |      0 |      1
               |      . |   0.00 |   0.00 |   2.78 |   0.00 |   0.00 |      . |   2.78
               |      . |   0.00 |   0.00 | 100.00 |   0.00 |   0.00 |      . |
               |      . |   0.00 |   0.00 |   9.09 |   0.00 |   0.00 |      . |
      ---------+--------+--------+--------+--------+--------+--------+--------+
      51-100   |      0 |      1 |      1 |      1 |      1 |      0 |      0 |      4
               |      . |   2.78 |   2.78 |   2.78 |   2.78 |   0.00 |      . |  11.11
               |      . |  25.00 |  25.00 |  25.00 |  25.00 |   0.00 |      . |
               |      . |  33.33 |   6.25 |   9.09 |  25.00 |   0.00 |      . |
      ---------+--------+--------+--------+--------+--------+--------+--------+
      >100     |      1 |      2 |     14 |      8 |      3 |      1 |      0 |     28
               |      . |   5.56 |  38.89 |  22.22 |   8.33 |   2.78 |      . |  77.78
               |      . |   7.14 |  50.00 |  28.57 |  10.71 |   3.57 |      . |
               |      . |  66.67 |  87.50 |  72.73 |  75.00 |  50.00 |      . |
      ---------+--------+--------+--------+--------+--------+--------+--------+
      TOTAL           .        3       16       11        4        2        .       36
                      .     8.33    44.44    30.56    11.11     5.56        .   100.00
```

Science Masters Degrees Awarded

Table 472. Number and percent of institutions awarding various numbers of masters degrees in science by institutions with various percents of faculty with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF SCIMS BY FACSKL4

SCIMS     NUM SCIENCE MASTER DEGREES 74-79   FACSKL4   PERC FACULTY WHO CAN PROGRAM COMPUTER

FREQUENCY|        Percent of Faculty with Ability to Program a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     67 |     16 |     25 |     19 |     15 |      4 |     16 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      3 |      1 |      2 |      0 |      0 |      0 |      0 |      3
         |      . |   2.78 |   5.56 |   0.00 |   0.00 |   0.00 |   0.00 |   8.33
         |      . |  33.33 |  66.67 |   0.00 |   0.00 |   0.00 |   0.00 |
         |      . |  33.33 |  16.67 |   0.00 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      0 |      1 |      0 |      0 |      0 |      1
         |      . |   0.00 |   0.00 |   2.78 |   0.00 |   0.00 |   0.00 |   2.78
         |      . |   0.00 |   0.00 | 100.00 |   0.00 |   0.00 |   0.00 |
         |      . |   0.00 |   0.00 |   7.69 |   0.00 |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      0 |      0 |      0 |      2 |      1 |      0 |      1 |      4
         |      . |   0.00 |   0.00 |   5.56 |   2.78 |   0.00 |   2.78 |  11.11
         |      . |   0.00 |   0.00 |  50.00 |  25.00 |   0.00 |  25.00 |
         |      . |   0.00 |   0.00 |  15.38 |  33.33 |   0.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>100     |      1 |      2 |     10 |     10 |      2 |      3 |      1 |     28
         |      . |   5.56 |  27.78 |  27.78 |   5.56 |   8.33 |   2.78 |  77.78
         |      . |   7.14 |  35.71 |  35.71 |   7.14 |  10.71 |   3.57 |
         |      . |  66.67 |  83.33 |  76.92 |  66.67 | 100.00 |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        3       12       13        3        3        2       36
                .     8.33    33.33    36.11     8.33     8.33     5.56   100.00
```

Science Masters Degrees Awarded

Table 473. Number and percent of institutions awarding various numbers of masters degrees in science by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                        TABLE OF SCID BY NEWSKL1

SCID      NUMBER SCIENCE DOCTORATES 74-79   NEWSKL1   PERC NEW STUD NO COMPUTER SKILLS

FREQUENCY| Percent of Newly Entering Students with No Computer Training or Skills
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     71 |     15 |     18 |     10 |      7 |     17 |     46 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      4 |      2 |      3 |      1 |      2 |      1 |      5 |     14
         |      . |  14.29 |  21.43 |   7.14 |  14.29 |   7.14 |  35.71 | 100.00
         |      . |  14.29 |  21.43 |   7.14 |  14.29 |   7.14 |  35.71 |
         |      . | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      0 |      0 |      0 |      0 |      0 |      0
         |      . |      . |      . |      . |      . |      . |      . |   0.00
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        2        3        1        2        1        5       14
                .    14.29    21.43     7.14    14.29     7.14    35.71   100.00
```

Science Doctorate Degrees Awarded

Table 474. Number and percent of institutions awarding various numbers of doctorate degrees in science by institutions with various percents of newly entering students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

-909-

Percent of Newly Entering Students with General Awareness of Computers

Science Doctorate Degrees Awarded

```
                                TABLE OF SCID BY NEWSKL2

SCID       NUMBER SCIENCE DOCTORATES 74-79   NEWSKL2   PERC NEW STUD GENL AWARE OF COMPUTERS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     71 |     25 |     39 |     12 |      8 |     10 |     19 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      4 |      1 |      7 |      0 |      5 |      0 |      1 |     14
         |      . |   7.14 |  50.00 |      . |  35.71 |      . |   7.14 | 100.00
         |      . |   7.14 |  50.00 |      . |  35.71 |      . |   7.14 |
         |      . | 100.00 | 100.00 |      . | 100.00 |      . | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      0 |      0 |      0 |      0 |      0 |      0
         |      . |      . |      . |      . |      . |      . |      . |   0.00
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        1        7        .        5        .        1       14
                .     7.14    50.00        .    35.71        .     7.14   100.00
```

Table 475. Number and percent of institutions awarding various numbers of doctorate degrees in science by institutions with various percents of newly entering students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                    TABLE OF SCID BY NEWSKL3

SCID      NUMBER SCIENCE DOCTORATES 74-79    NEWSKL3   PERC NEW STUD LIMITED COMPU

FREQUENCY| Percent of Newly Entering Students with Limited
PERCENT  |        Personal Computer Use and Skill
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |  TOTAL
---------+--------+--------+--------+--------+
       .  |     71 |     50 |     55 |      8 |      .
          |      . |      . |      . |      . |      .
          |      . |      . |      . |      . |
          |      . |      . |      . |      . |
---------+--------+--------+--------+--------+
0-10      |      4 |      3 |      8 |      3 |     14
          |      . |  21.43 |  57.14 |  21.43 | 100.00
          |      . |  21.43 |  57.14 |  21.43 |
          |      . | 100.00 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+
26-50     |      1 |      0 |      0 |      0 |      0
          |      . |      . |      . |      . |   0.00
          |      . |      . |      . |      . |
          |      . |      . |      . |      . |
---------+--------+--------+--------+--------+
TOTAL            .        3        8        3       14
                 .    21.43    57.14    21.43   100.00
```

Science Doctorate Degrees Awarded

Table 476. Number and percent of institutions awarding various numbers of doctorate degrees in science by institutions with various percents of newly entering students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                    S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                    21:39 WEDNESDAY, SEPTE

                                TABLE OF SCID BY NEWSKL4

SCID      NUMBER SCIENCE DOCTORATES 74-79    NEWSKL4    PERC NEW STUD WHO CAN PROGRAM COMPUT

FREQUENCY| Percent of Newly Entering Students with Ability to Program a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+
       .  |     71 |     68 |     42 |      2 |      1 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+
0-10     |      4 |      6 |      7 |      0 |      0 |      1 |     14
         |      . |  42.86 |  50.00 |      . |      . |   7.14 | 100.00
         |      . |  42.86 |  50.00 |      . |      . |   7.14 |
         |      . | 100.00 | 100.00 |      . |      . | 100.00 |
---------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      0 |      0 |      0 |      0 |      0
         |      . |      . |      . |      . |      . |      . |   0.00
         |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+
TOTAL           .        6        7        .        .        1       14
                .    42.86    50.00        .        .     7.14   100.00
```

Science Doctorate Degrees Awarded

Table 477. Number and percent of institutions awarding various numbers of doctorate degrees in science by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF SCID BY OLDSKL1

SCID       NUMBER SCIENCE DOCTORATES 74-79    OLDSKL1    PERC CURRENT STUD NO COMPUTER SKILLS

FREQUENCY| Percent of Currently Enrolled Students with No Computer Training or Skills
 PERCENT |
 ROW PCT |
 COL PCT |        .|        0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|   TOTAL
---------+---------+---------+--------+--------+--------+--------+--------+
       . |      70 |      31 |     21 |     17 |     11 |     15 |     19 |       .
         |       . |       . |      . |      . |      . |      . |      . |       .
         |       . |       . |      . |      . |      . |      . |      . |
         |       . |       . |      . |      . |      . |      . |      . |
---------+---------+---------+--------+--------+--------+--------+--------+
0-10     |       3 |       3 |      6 |      4 |      1 |      0 |      1 |      15
         |       . |   20.00 |  40.00 |  26.67 |   6.67 |      . |   6.67 |  100.00
         |       . |   20.00 |  40.00 |  26.67 |   6.67 |      . |   6.67 |
         |       . |  100.00 | 100.00 | 100.00 | 100.00 |      . | 100.00 |
---------+---------+---------+--------+--------+--------+--------+--------+
26-50    |       1 |       0 |      0 |      0 |      0 |      0 |      0 |       0
         |       . |       . |      . |      . |      . |      . |      . |    0.00
         |       . |       . |      . |      . |      . |      . |      . |
         |       . |       . |      . |      . |      . |      . |      . |
---------+---------+---------+--------+--------+--------+--------+--------+
TOTAL            .         3        6        4        1        .        1        15
                 .     20.00    40.00    26.67     6.67        .     6.67    100.00
```

Science Doctorate Degrees Awarded

Table 478. Number and percent of institutions awarding various numbers of doctorate degrees in science by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF SCID BY OLDSKL2

SCID      NUMBER SCIENCE DOCTORATES 74-79   OLDSKL2   PERC CURRENT STUD GENL AWARE COMPUTERS

FREQUENCY|  Percent of Currently Enrolled Students with General Awareness of Computers
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     70 |     22 |     44 |     24 |     10 |      9 |      5 |     .
         |      . |      . |      . |      . |      . |      . |      . |     .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      3 |      2 |      3 |      4 |      4 |      2 |      0 |     15
         |      . |  13.33 |  20.00 |  26.67 |  26.67 |  13.33 |      . | 100.00
         |      . |  13.33 |  20.00 |  26.67 |  26.67 |  13.33 |      . |
         |      . | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      0 |      0 |      0 |      0 |      0 |      0
         |      . |      . |      . |      . |      . |      . |      . |   0.00
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        2        3        4        4        2        .       15
                .    13.33    20.00    26.67    26.67    13.33        .   100.00

Science Doctorate Degrees Awarded
```

Table 479. Number and percent of institutions awarding various numbers of doctorate degrees in science by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
              S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                          21:39 WEDNESDAY, SEPTE

                              TABLE OF SCID BY OLDSKL3

SCID      NUMBER SCIENCE DOCTORATES 74-79   OLDSKL3   PERC CURRENT STUD LIMITED COMPUTER USE

FREQUENCY| Percent of Currently Enrolled Students with Limited Personal Computer Use
PERCENT  |                           and Skill
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       .  |      70 |      25 |      61 |      14 |       9 |       1 |       4 |       .
         |       . |       . |       . |       . |       . |       . |       . |       .
         |       . |       . |       . |       . |       . |       . |       . |
         |       . |       . |       . |       . |       . |       . |       . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |       3 |       1 |      11 |       3 |       0 |       0 |       0 |      15
         |       . |    6.67 |   73.33 |   20.00 |       . |       . |       . |  100.00
         |       . |    6.67 |   73.33 |   20.00 |       . |       . |       . |
         |       . |  100.00 |  100.00 |  100.00 |       . |       . |       . |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |       1 |       0 |       0 |       0 |       0 |       0 |       0 |       0
         |       . |       . |       . |       . |       . |       . |       . |    0.00
         |       . |       . |       . |       . |       . |       . |       . |
         |       . |       . |       . |       . |       . |       . |       . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .         1        11         3         .         .         .        15
                .      6.67     73.33     20.00         .         .         .    100.00
```

Science Doctorate Degrees Awarded

Table 480. Number and percent of institutions awarding various numbers of doctorate degrees in science by institutions with various percents of currently enrolled students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                          21:39 WEDNESD   SEPTEMBE

                        TABLE OF SCID BY OLDSKL4

SCID      NUMBER SCIENCE DOCTORATES 74-79   OLDSKL4   PERC CURRENT STUD WHO CAN PROGRAM COMP

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     70 |     34 |     49 |     13 |     11 |      3 |      4 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      3 |      0 |      9 |      3 |      0 |      2 |      1 |     15
         |      . |      . |  60.00 |  20.00 |      . |  13.33 |   6.67 | 100.00
         |      . |      . |  60.00 |  20.00 |      . |  13.33 |   6.67 |
         |      . |      . | 100.00 | 100.00 |      . | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      0 |      0 |      0 |      0 |      0 |      0
         |      . |      . |      . |      . |      . |      . |      . |   0.00
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        .        9        3        .        2        1       15
                .        .    60.00    20.00        .    13.33     6.67   100.00
```

Percent of Currently Enrolled Students with Ability to Program a Computer

Science Doctorate Degrees Awarded

Table 481. Number and percent of institutions awarding various numbers of doctorate degrees in science by institutions with various percents of currently enrolled students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                 21:39 WEDNESDAY, SEPTEMBE

                              TABLE OF SCID BY FACSKL1

SCID      NUMBER SCIENCE DOCTORATES 74-79   FACSKL1   PERCENT FACULTY NO COMPUTER SKILLS

FREQUENCY|      Percent of Faculty with No Computer Training or Skills
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |      68|      72|      17|      12|       7|       5|       3|      .
         |       .|       .|       .|       .|       .|       .|       .|      .
         |       .|       .|       .|       .|       .|       .|       .|
         |       .|       .|       .|       .|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |       3|      10|       0|       2|       1|       1|       1|     15
         |       .|   66.67|       .|   13.33|    6.67|    6.67|    6.67| 100.00
         |       .|   66.67|       .|   13.33|    6.67|    6.67|    6.67|
         |       .|  100.00|       .|  100.00|  100.00|  100.00|  100.00|
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |       1|       0|       0|       0|       0|       0|       0|      0
         |       .|       .|       .|       .|       .|       .|       .|   0.00
         |       .|       .|       .|       .|       .|       .|       .|
         |       .|       .|       .|       .|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL            .       10        .        2        1        1        1      15
                 .    66.67        .    13.33     6.67     6.67     6.67  100.00
```

Science Doctorate Degrees Awarded

Table 482. Number and percent of institutions awarding various numbers of doctorate degrees in science by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Faculty with General Awareness of Computers

Science Doctorate Degrees Awarded

```
                               TABLE OF SCID BY FACSKL2

SCID      NUMBER SCIENCE DOCTORATES 74-79    FACSKL2   PERC FACULTY GENL AWARE OF COMPUTERS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     68 |     34 |     21 |     29 |     16 |     13 |      3 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      3 |      1 |      7 |      3 |      3 |      1 |      0 |     15
         |      . |   6.67 |  46.67 |  20.00 |  20.00 |   6.67 |      . | 100.00
         |      . |   6.67 |  46.67 |  20.00 |  20.00 |   6.67 |      . |
         |      . | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      0 |      0 |      0 |      0 |      0 |      0
         |      . |      . |      . |      . |      . |      . |      . |   0.00
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL             .        1        7        3        3        1        .       15
                  .     6.67    46.67    20.00    20.00     6.67        .   100.00
```

Table 483. Number and percent of institutions awarding various numbers of doctorate degrees in science by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                          S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                                   21:39 WEDNESDAY, SEPTEMBE

                                            TABLE OF SCID BY FACSKL3

        SCID      NUMBER SCIENCE DOCTORATES 74-79   FACSKL3   PERC FACULTY LIMITED COMPUTER USE-SKILL

        FREQUENCY| Percent of Faculty with Limited Personal Computer Use and Skill
         PERCENT |
         ROW PCT |
         COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
        ---------+--------+--------+--------+--------+--------+--------+--------+
            .    |     68 |     23 |     47 |     26 |     14 |      3 |      3 |     .
                 |      . |      . |      . |      . |      . |      . |      . |     .
                 |      . |      . |      . |      . |      . |      . |      . |
                 |      . |      . |      . |      . |      . |      . |      . |
        ---------+--------+--------+--------+--------+--------+--------+--------+
        0-10     |      3 |      3 |      6 |      3 |      2 |      1 |      0 |    15
                 |      . |  20.00 |  40.00 |  20.00 |  13.33 |   6.67 |      . | 100.00
                 |      . |  20.00 |  40.00 |  20.00 |  13.33 |   6.67 |      . |
                 |      . | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |      . |
        ---------+--------+--------+--------+--------+--------+--------+--------+
        26-50    |      1 |      0 |      0 |      0 |      0 |      0 |      0 |     0
                 |      . |      . |      . |      . |      . |      . |      . |   0.00
                 |      . |      . |      . |      . |      . |      . |      . |
                 |      . |      . |      . |      . |      . |      . |      . |
        ---------+--------+--------+--------+--------+--------+--------+--------+
        TOTAL           .        3        6        3        2        1        .      15
                        .    20.00    40.00    20.00    13.33     6.67        .  100.00
```

Science Doctorate Degrees Awarded

Table 484. Number and percent of institutions awarding various numbers of doctorate degrees in science by institutions with various percents of faculty with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Science Doctorate Degrees Awarded

```
                S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                              21:39 WEDNESDAY, SEPTEMBER

                              TABLE OF SCID BY FACSKL4

SCID      NUMBER SCIENCE DOCTORATES 74-79   FACSKL4   PERC FACULTY WHO CAN PROGRAM COMPUTER

FREQUENCY|
PERCENT  |       Percent of Faculty with Ability to Program a Computer
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     68 |     18 |     32 |     26 |     17 |      7 |     16 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      3 |      1 |      5 |      6 |      1 |      0 |      2 |     15
         |      . |   6.67 |  33.33 |  40.00 |   6.67 |      . |  13.33 | 100.00
         |      . |   6.67 |  33.33 |  40.00 |   6.67 |      . |  13.33 |
         |      . | 100.00 | 100.00 | 100.00 | 100.00 |      . | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      0 |      0 |      0 |      0 |      0 |      0
         |      . |      . |      . |      . |      . |      . |      . |   0.00
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        1        5        6        1        .        2       15
                .     6.67    33.33    40.00     6.67        .    13.33   100.00
```

Table 485. Number and percent of institutions awarding various numbers of doctorate degrees in science by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                     S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                          21:39 WEDNESDAY, SEPTEMBEF

                                   TABLE OF SOTH1 BY NEWSKL1

   SOTH1      N OTHER SCI DEGS NOT SPECIFIED 74-79     NEWSKL1    PERC NEW STUD NO COMPUTER SKILLS

   FREQUENCY|
    PERCENT |
    ROW PCT |
    COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
   ---------+--------+--------+--------+--------+--------+--------+--------+
          . |     72 |     16 |     20 |     11 |      9 |     18 |     46 |      .
            |      . |      . |      . |      . |      . |      . |      . |      .
            |      . |      . |      . |      . |      . |      . |      . |
            |      . |      . |      . |      . |      . |      . |      . |
   ---------+--------+--------+--------+--------+--------+--------+--------+
   0-50     |      4 |      1 |      1 |      0 |      0 |      0 |      5 |      7
            |      . |  14,29 |  14,29 |      . |      . |      . |  71,43 | 100.00
            |      . |  14,29 |  14,29 |      . |      . |      . |  71,43 |
            |      . | 100,00 | 100,00 |      . |      . |      . | 100,00 |
   ---------+--------+--------+--------+--------+--------+--------+--------+
   TOTAL           .        1        1        .        .        .        5        7
                   .    14,29    14,29        .        .        .    71,43   100.00
```

Percent of Newly Entering Students with No Computer Training or Skills

Other Science Degrees Awarded

-618-

Table 486. Number and percent of institutions awarding numbers of other degrees in science by institutions with various percents of newly entering students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M              21:39 WEDNES[illegible], SEPTEMBE

                             TABLE OF SOTH1 BY NEWSKL2

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79    NEWSKL2   PERC NEW STUD GENL AWARE OF COMPUTERS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     72 |     25 |     42 |     12 |     12 |     10 |     19 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |      4 |      1 |      4 |      0 |      1 |      0 |      1 |      7
         |      . |  14,29 |  57,14 |      . |  14,29 |      . |  14,29 | 100,00
         |      . |  14,29 |  57,14 |      . |  14,29 |      . |  14,29 |
         |      . | 100,00 | 100,00 |      . | 100,00 |      . | 100,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        1        4        .        1        .        1        7
                .    14,29    57,14        .    14,29        .    14,29   100,00
```

Percent of Newly Entering Students with General Awareness of Computers

Other Science Degrees Awarded

-619-

Table 487. Number and percent of institutions awarding numbers of other degrees in science by institutions with various percents of newly entering students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF SOTH1 BY NEWSKL3

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79   NEWSKL3   F

FREQUENCY| Percent of Newly Entering Students with
PERCENT  | Limited Personal Computer Use and Skill
ROW PCT  |
COL PCT  |       .|        0|1%-20%  |21%-40% |  TOTAL
---------+--------+---------+--------+--------+
       . |     72 |      51 |     59 |     10 |      .
         |      . |       . |      . |      . |      .
         |      . |       . |      . |      . |
         |      . |       . |      . |      . |
---------+--------+---------+--------+--------+
0-50     |      4 |       2 |      4 |      1 |      7
         |      . |   28.57 |  57.14 |  14.29 | 100.00
         |      . |   28.57 |  57.14 |  14.29 |
         |      . |  100.00 | 100.00 | 100.00 |
---------+--------+---------+--------+--------+
TOTAL           .         2        4        1        7
                .     28.57    57.14    14.29   100.00
```

Other Science Degrees Awarded

Table 488 Number and percent of institutions awarding numbers of other degrees in science by institutions with various percents of newly entering students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                        TABLE OF SOTH1 BY NEWSKL4

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79   NEWSKL4   PERC NEW STUD WHO CAN PROGRAM COMP

FREQUENCY| Percent of Newly Entering Students with Ability to Program a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+
       . |      72|      68|      48|       2|       1|       1|       .
         |       .|       .|       .|       .|       .|       .|       .
         |       .|       .|       .|       .|       .|       .|
         |       .|       .|       .|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+
0-50     |       4|       6|       1|       0|       0|       0|       7
         |       .|   85.71|   14.29|       .|       .|       .|  100.00
         |       .|   85.71|   14.29|       .|       .|       .|
         |       .|  100.00|  100.00|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+
TOTAL            .        6        1        .        .        .       7
                 .    85.71    14.29        .        .        .  100.00
```

Other Science Degrees Awarded

Table 489. Number and percent of institutions awarding numbers of other degrees in science by institutions with various percents of newly entering students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
         S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                         21:39 WEDNESDAY, SEPTEMBE

                            TABLE OF SOTH1 BY OLDSKL1

SOTH1      N OTHER SCI DEGS NOT SPECIFIED 74-79    OLDSKL1   PERC CURRENT STUD NO COMPUTER SKILLS

FREQUENCY| Percent of Currently Enrolled Students with No Computer Training or Skills
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     70 |     32 |     26 |     20 |     12 |     12 |     20 |       .
         |      . |      . |      . |      . |      . |      . |      . |       .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |      4 |      2 |      1 |      1 |      0 |      3 |      0 |       7
         |      . |  28.57 |  14.29 |  14.29 |      . |  42.86 |      . |  100.00
         |      . |  28.57 |  14.29 |  14.29 |      . |  42.86 |      . |
         |      . | 100.00 | 100.00 | 100.00 |      . | 100.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        2        1        1        .        3        .        7
                .    28.57    14.29    14.29        .    42.86        .   100.00
```

Other Science Degrees Awarded

Table 490. Number and percent of institutions awarding numbers of other degrees in science by institutions with various percents of currently enrolled students with no computer training or skills, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                     S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                                21:39 WEDNESDA   SEPTEMBE

                                     TABLE OF SOTH1 BY OLDSKL2

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79   OLDSKL2   PERC CURRENT STUD GENL AWARE COMPUTERS

FREQUENCY|   Percent of Currently Enrolled Students with General Awareness of Computers
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     70 |     23 |     43 |     28 |     14 |      9 |      5 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |      4 |      1 |      4 |      0 |      0 |      2 |      0 |      7
         |      . |  14.29 |  57.14 |      . |      . |  28.57 |      . | 100.00
         |      . |  14.29 |  57.14 |      . |      . |  28.57 |      . |
         |      . | 100.00 | 100.00 |      . |      . | 100.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        1        4        .        .        2        .        7
                .    14.29    57.14        .        .    28.57        .   100.00
```

Other Science Degrees Awarded

Table 491. Number and percent of institutions awarding numbers of other degrees in science by institutions with various percents of currently enrolled students with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                  S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                              21:39 WEDNESDAY, SEPTEMBE

                            TABLE OF SOTH1 BY OLDSKL3

      SOTH1      N OTHER SCI DEGS NOT SPECIFIED 74-79    OLDSKL3   PERC CURRENT STUD LIMITED COMPUTER USE

      FREQUENCY|  Percent of Currently Enrolled Students with Limited Personal Computer Use
      PERCENT  |                              and Skill
      ROW PCT  |
      COL PCT  |        .|       0|1%-20% |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
      ---------+--------+--------+--------+--------+--------+--------+--------+
             . |     70 |     26 |     66 |     17 |      8 |      1 |      4 |     .
               |      . |      . |      . |      . |      . |      . |      . |     .
               |      . |      . |      . |      . |      . |      . |      . |
               |      . |      . |      . |      . |      . |      . |      . |
      ---------+--------+--------+--------+--------+--------+--------+--------+
      0-50     |      4 |      0 |      6 |      0 |      1 |      0 |      0 |      7
               |      . |      . |  85.71 |      . |  14.29 |      . |      . | 100.00
               |      . |      . |  85.71 |      . |  14.29 |      . |      . |
               |      . |      . | 100.00 |      . | 100.00 |      . |      . |
      ---------+--------+--------+--------+--------+--------+--------+--------+
      TOTAL           .        .        6        .        1        .        .        7
                      .        .    85.71        .    14.29        .        .   100.00
```

Other Science Degrees Awarded

Table 492. Number and percent of institutions awarding numbers of other degrees in science by institutions with various percents of currently enrolled students with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                           TABLE OF SOTH1 BY OLDSKL4

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79   OLDSKL4   PERC CURRENT STUD WHO CAN PROGRAM COMP

FREQUENCY| Percent of Currently Enrolled Students with Ability to Program a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     70 |     34 |     52 |     16 |     11 |      4 |      5 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |      4 |      0 |      6 |      0 |      0 |      1 |      0 |      7
         |      . |      . |  85.71 |      . |      . |  14.29 |      . | 100.00
         |      . |      . |  85.71 |      . |      . |  14.29 |      . |
         |      . |      . | 100.00 |      . |      . | 100.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        .        6        .        .        1        .        7
                .        .    85.71        .        .    14.29        .   100.00
```

Other Science Degrees Awarded

Table 493. Number and percent of institutions awarding numbers of other degrees in science by institutions with various percents of currently enrolled students with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF SOTH1 BY FACSKL1

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79   FACSKL1   PERCENT FACULTY NO COMPUTER SKILLS

FREQUENCY|        Percent of Faculty with No Computer Training or Skills
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     68 |     76 |     17 |     14 |      8 |      5 |      4 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |      4 |      6 |      0 |      0 |      0 |      1 |      0 |      7
         |      . |  85.71 |      . |      . |      . |  14.29 |      . | 100.00
         |      . |  85.71 |      . |      . |      . |  14.29 |      . |
         |      . | 100.00 |      . |      . |      . | 100.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        6        .        .        .        1        .        7
                .    85.71        .        .        .    14.29        .   100.00
```

Other Science Degrees Awarded

Table 494. Number and percent of institutions awarding numbers of other degrees in science by institutions with various percents of faculty with no computer training or skills, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Other Science Degrees Awarded

Percent of Faculty with General Awareness of Computers

```
                              TABLE OF SOTH1 BY FACSKL2

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79    FACSKL2   PERC FACULTY GENL AWARE OF COMPUTERS

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
        .|     68 |     33 |     26 |     31 |     17 |     14 |      3 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |      4 |      2 |      2 |      1 |      2 |      0 |      0 |      7
         |      . |  28.57 |  28.57 |  14.29 |  28.57 |      . |      . | 100.00
         |      . |  28.57 |  28.57 |  14.29 |  28.57 |      . |      . |
         |      . | 100.00 | 100.00 | 100.00 | 100.00 |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        2        2        1        2        .        .        7
                .    28.57    28.57    14.29    28.57        .        .   100.00
```

Table 495. Number and percent of institutions awarding numbers of other degrees in science by institutions with various percents of faculty with general awareness of computers, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
              S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                         21:39 WEDNESDAY, SEPTEMBER

                           TABLE OF SOTH1 BY FACSKL3

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79    FACSKL3    PERC FACULTY LIMITED COMPUTER USE-SKILL

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     68 |     23 |     51 |     28 |     15 |      4 |      3 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |      4 |      3 |      2 |      1 |      1 |      0 |      0 |      7
         |      . |  42.86 |  28.57 |  14.29 |  14.29 |      . |      . | 100.00
         |      . |  42.86 |  28.57 |  14.29 |  14.29 |      . |      . |
         |      . | 100.00 | 100.00 | 100.00 | 100.00 |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        3        2        1        1        .        .        7
                .    42.86    28.57    14.29    14.29        .        .   100.00
```

Percent of Faculty with Limited Personal Computer Use and Skill

Other Science Degrees Awarded

Table496 . Number and percent of institutions awarding numbers of other degrees in science by institutions with various percents of faculty with limited personal computer use and skill, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                   S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                   21:39 WEDNESDAY, SEPTEMBER

                                  TABLE OF SOTH1 BY FACSKL4

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79   FACSKL4   PERC FACULTY WHO CAN PROGRAM COMPUTER

Other Science Degrees Awarded

FREQUENCY|          Percent of Faculty with Ability to Program a Computer
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
        .|      68 |     19 |      36 |      30 |      16 |       7 |      16 |       .
         |       . |      . |       . |       . |       . |       . |       . |       .
         |       . |      . |       . |       . |       . |       . |       . |
         |       . |      . |       . |       . |       . |       . |       . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |       4 |      0 |       1 |       2 |       2 |       0 |       2 |       7
         |       . |      . |   14.29 |   28.57 |   28.57 |       . |   28.57 |  100.00
         |       . |      . |   14.29 |   28.57 |   28.57 |       . |   28.57 |
         |       . |      . |  100.00 |  100.00 |  100.00 |       . |  100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL            .        .        1        2        2        .        2        7
                 .        .    14.29    28.57    28.57        .    28.57   100.00
```

Table 497. Number and percent of institutions awarding numbers of other degrees in science by institutions with various percents of faculty with ability to program a computer, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

in their departments who use computers for various academic purposes. If it is found that science faculty make greater use of computers for academic purposes in institutions that award larger numbers of degrees in the sciences, yet another link between higher education in the sciences and academic computing will have been demonstrated. However, it must be realized that this is another instance in which the direction of any causal relationships that might exist between these variables is unclear. These relationships are summarized in Figure 11 and are shown in greater detail in Tables 498 through 517.

It appears that the summary in Figure 11 will support the following generalizations: In institutions that award a greater number of associate degrees in the sciences, the percentages of science faculty who use computers for administrative purposes in their classes, for instructional purposes in their classes, and for independent purposes such as experimentation and games, are all slightly smaller. There appears to be no relationship between science faculty use of computers in conjunction with their own research, and the productivity of their institutions in awarding associate degrees in the sciences.

In minority higher education institutions that award a greater number of bachelors degrees in the sciences, the percentage of science faculty reported to use computers for administrative purposes in their classes, for instructional purposes in their classes, and in conjunction with their own research, are all slightly higher. In contrast, the percentage of science faculty reported to use computers for independent purposes, such as experimentation and games, is slightly lower.

Relationships between minority institutions' productivity of higher-level science degrees (science masters degrees, science doctoral degrees, and "other science degrees") and the extensiveness of their science faculty's use of

Degrees Awarded (Productivity)	Purpose of Computer Use by Faculty in Sciences			
	Administrative	Instructional	Research	Games-Experimental
Science Associate Degree	Table 498. Slight negative relationship. Contingency coeff. = 0.46	Table 499. Slight negative relationship. Contingency coeff. = 0.57	Table 500. No consistent relationship. Contingency coeff. = 0.58	Table 501. Slight negative relationship. Contingency coeff. = 0.65
Science Bachelors Degree	Table 502. Slight positive relationship. Contingency coeff. = 0.48	Table 503. Slight positive relationship. Contingency coeff. = 0.56	Table 504. Slight positive relationship. Contingency coeff. = 0.55	Table 505. Slight negative relationship. Contingency coeff. = 0.39
Science Masters Degree	Table 506. Indeterminate due to small sample size.	Table 507. Indeterminate due to small sample size.	Table 508. Indeterminate due to small sample size.	Table 509. Indeterminate due to small sample size.
Science Doctoral Degree	Table 510. Indeterminate due to small sample size.	Table 511. Indeterminate due to small sample size.	Table 512. Indeterminate due to small sample size.	Table 513. Indeterminate due to small sample size.
Other Science Degrees	Table 514. Indeterminate due to small sample size.	Table 515. Indeterminate due to small sample size.	Table 516. Indeterminate due to small sample size.	Table 517. Indeterminate due to small sample size.

Figure 11. Summary of relationships between the degree productivity of minority higher education institutions and percent of faculty in science departments who use computers for various academic purposes, as reported by 83 academic vice presidents or deans and 178 heads of science departments.

```
                   S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                   21:39 WEDNESDAY, SEPTEMBE

                                  TABLE OF SCIAA BY FACADM

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79    FACADM    PERC FACULTY USE FOR ADMIN OF CLASSES

FREQUENCY|Percent of Faculty Having Access to Computers for Administrative Purposes
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     51 |     36 |     20 |     10 |     10 |      3 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |     26 |      3 |      3 |      1 |      0 |      1 |      2 |     10
         |      . |   9.09 |   9.09 |   3.03 |      . |   3.03 |   6.06 |  30.30
         |      . |  30.00 |  30.00 |  10.00 |      . |  10.00 |  20.00 |
         |      . |  21.43 |  27.27 |  33.33 |      . |  50.00 |  66.67 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      3 |      2 |      0 |      0 |      0 |      0 |      0 |      2
         |      . |   6.06 |   0.00 |   0.00 |      . |   0.00 |   0.00 |   6.06
         |      . | 100.00 |   0.00 |   0.00 |      . |   0.00 |   0.00 |
         |      . |  14.29 |   0.00 |   0.00 |      . |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      4 |      4 |      2 |      1 |      0 |      1 |      1 |      9
         |      . |  12.12 |   6.06 |   3.03 |      . |   3.03 |   3.03 |  27.27
         |      . |  44.44 |  22.22 |  11.11 |      . |  11.11 |  11.11 |
         |      . |  28.57 |  18.18 |  33.33 |      . |  50.00 |  33.33 |
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |      3 |      4 |      4 |      1 |      0 |      0 |      0 |      9
         |      . |  12.12 |  12.12 |   3.03 |      . |   0.00 |   0.00 |  27.27
         |      . |  44.44 |  44.44 |  11.11 |      . |   0.00 |   0.00 |
         |      . |  28.57 |  36.36 |  33.33 |      . |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      2 |      1 |      2 |      0 |      0 |      0 |      0 |      3
         |      . |   3.03 |   6.06 |   0.00 |      . |   0.00 |   0.00 |   9.09
         |      . |  33.33 |  66.67 |   0.00 |      . |   0.00 |   0.00 |
         |      . |   7.14 |  18.18 |   0.00 |      . |   0.00 |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       14       11        3        .        2        3       33
                .    42.42    33.33     9.09        .     6.06     9.09   100.00
```

Science Associate Degrees Awarded

Table 498 Number and percent of institutions awarding various numbers of associate degrees in science by percent of faculty using computers for administrative purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                              TABLE OF SCIAA BY FACINS

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79   FACINS    PERC FACULTY USE FOR CLASS INSTRUCTION

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     46 |     24 |     31 |     12 |     11 |      2 |      6 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |     26 |      2 |      6 |      1 |      0 |      0 |      1 |     10
         |      . |   6.06 |  18.18 |   3.03 |   0.00 |      . |   3.03 |  30.30
         |      . |  20.00 |  60.00 |  10.00 |   0.00 |      . |  10.00 |
         |      . |  22.22 |  40.00 |  20.00 |   0.00 |      . |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      3 |      1 |      0 |      0 |      1 |      0 |      0 |      2
         |      . |   3.03 |   0.00 |   0.00 |   3.03 |      . |   0.00 |   6.06
         |      . |  50.00 |   0.00 |   0.00 |  50.00 |      . |   0.00 |
         |      . |  11.11 |   0.00 |   0.00 |  50.00 |      . |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      3 |      3 |      4 |      1 |      1 |      0 |      1 |     10
         |      . |   9.09 |  12.12 |   3.03 |   3.03 |      . |   3.03 |  30.30
         |      . |  30.00 |  40.00 |  10.00 |  10.00 |      . |  10.00 |
         |      . |  33.33 |  26.67 |  20.00 |  50.00 |      . |  50.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |      4 |      2 |      3 |      3 |      0 |      0 |      0 |      8
         |      . |   6.06 |   9.09 |   9.09 |   0.00 |      . |   0.00 |  24.24
         |      . |  25.00 |  37.50 |  37.50 |   0.00 |      . |   0.00 |
         |      . |  22.22 |  20.00 |  60.00 |   0.00 |      . |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      2 |      1 |      2 |      0 |      0 |      0 |      0 |      3
         |      . |   3.03 |   6.06 |   0.00 |   0.00 |      . |   0.00 |   9.09
         |      . |  33.33 |  66.67 |   0.00 |   0.00 |      . |   0.00 |
         |      . |  11.11 |  13.33 |   0.00 |   0.00 |      . |   0.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        9       15        5        2        .        2       33
                .    27.27    45.45    15.15     6.06        .     6.06   100.00
```

Percent of Faculty Having Access to Computers for Instructional Purposes

Science Associate Degrees Awarded

-633-

Table 499. Number and percent of institutions awarding various numbers of associate degrees in science by percent of faculty using computers for instructional purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

888

887

```
                              TABLE OF SCIAA BY FACRES

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79    FACRES    PERC FACULTY USE FOR RESEARCH

FREQUENCY|  Percent of Faculty Having Access to Computers for Research Purposes
 PERCENT |
 ROW PCT |
 COL PCT |        .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+---------+--------+--------+--------+--------+--------+--------+
       . |      50 |     22 |     34 |     15 |      8 |      1 |      2 |      .
         |       . |      . |      . |      . |      . |      . |      . |      .
         |       . |      . |      . |      . |      . |      . |      . |
         |       . |      . |      . |      . |      . |      . |      . |
---------+---------+--------+--------+--------+--------+--------+--------+
0-50     |      25 |      2 |      6 |      3 |      0 |      0 |      0 |     11
         |       . |   5.88 |  17.65 |   8.82 |   0.00 |      . |      . |  32.35
         |       . |  18.18 |  54.55 |  27.27 |   0.00 |      . |      . |
         |       . |  25.00 |  35.29 |  42.86 |   0.00 |      . |      . |
---------+---------+--------+--------+--------+--------+--------+--------+
51-100   |       3 |      1 |      0 |      0 |      1 |      0 |      0 |      2
         |       . |   2.94 |   0.00 |   0.00 |   2.94 |      . |      . |   5.88
         |       . |  50.00 |   0.00 |   0.00 |  50.00 |      . |      . |
         |       . |  12.50 |   0.00 |   0.00 |  50.00 |      . |      . |
---------+---------+--------+--------+--------+--------+--------+--------+
101-250  |       5 |      4 |      3 |      1 |      0 |      0 |      0 |      8
         |       . |  11.76 |   8.82 |   2.94 |   0.00 |      . |      . |  23.53
         |       . |  50.00 |  37.50 |  12.50 |   0.00 |      . |      . |
         |       . |  50.00 |  17.65 |  14.29 |   0.00 |      . |      . |
---------+---------+--------+--------+--------+--------+--------+--------+
251-500  |       2 |      0 |      6 |      3 |      1 |      0 |      0 |     10
         |       . |   0.00 |  17.65 |   8.82 |   2.94 |      . |      . |  29.41
         |       . |   0.00 |  60.00 |  30.00 |  10.00 |      . |      . |
         |       . |   0.00 |  35.29 |  42.86 |  50.00 |      . |      . |
---------+---------+--------+--------+--------+--------+--------+--------+
>1000    |       2 |      1 |      2 |      0 |      0 |      0 |      0 |      3
         |       . |   2.94 |   5.88 |   0.00 |   0.00 |      . |      . |   8.82
         |       . |  33.33 |  66.67 |   0.00 |   0.00 |      . |      . |
         |       . |  12.50 |  11.76 |   0.00 |   0.00 |      . |      . |
---------+---------+--------+--------+--------+--------+--------+--------+
TOTAL            .        8       17        7        2        .        .       34
                 .    23.53    50.00    20.59     5.88        .        .   100.00
```

Science Associate Degrees Awarded

Table 500. Number and percent of institutions awarding various numbers of associate degrees in science by percent of faculty using computers for research purposes as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Faculty Having Access to Computers for Games-Experimental Purposes

Science Associate Degrees Awarded

```
                            TABLE OF SCIAA BY FACGE

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79   FACGE     PERC FACULTY USE FOR GAMES-EXPERIMENT

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     67 |     34 |     17 |      6 |      8 |      0 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |     27 |      2 T      6 |      0 :      0 |      0 |      1 |      9
         |      . |   7,69 |  23.08 |   0,00 |      . |   0,00 |   3,85 |  34,62
         |      . |  22,22 |  66,67 |   0,00 |      . |   0,00 |  11,11 |
         |      . |  25,00 |  40,00 |   0,00 |      . |   0,00 | 100,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      3 |      1 |      0 |      0 |      0 |      1 |      0 |      2
         |      . |   3,85 |   0.00 |   0,00 |      . |   3,85 |   0,00 |   7,69
         |      . |  50,00 |   0.00 |   0,00 |      . |  50,00 |   0,00 |
         |      . |  12,50 |   0.00 |   0,00 |      . | 100,00 |   0,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
101-250  |      6 |      2 |      4 |      1 |      0 |      0 |      0 |      7
         |      . |   7,69 |  15,38 |   3,85 |      . |   0,00 |   0,00 |  26,92
         |      . |  28,57 |  57.14 |  14,29 |      . |   0,00 |   0,00 |
         |      . |  25,00 |  26.67 | 100,00 |      . |   0,00 |   0,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
251-500  |      7 |      2 |      3 |      0 |      0 |      0 |      0 |      5
         |      . |   7,69 |  11,54 |   0,00 |      . |   0,00 |   0,00 |  19,23
         |      . |  40,00 |  60,00 |   0,00 |      . |   0,00 |   0,00 |
         |      . |  25,00 |  20,00 |   0,00 |      . |   0,00 |   0,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
>1000    |      2 |      1 |      2 |      0 |      0 |      0 |      0 |      3
         |      . |   3,85 |   7,69 |   0,00 |      . |   0,00 |   0,00 |  11,54
         |      . |  33,33 |  66,67 |   0,00 |      . |   0,00 |   0,00 |
         |      . |  12,50 |  13,33 |   0,00 |      . |   0,00 |   0,00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        8       15        1        .        1        1       26
                .    30,77    57,69     3,85        .     3,85     3,85   100,00
```

Table 501. Number and percent of institutions awarding various numbers of associate degrees in science by percent of faculty using computers for games-experimental purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Faculty Having Access to Computers for Administrative Purposes

Science Bachelors Degrees Awarded

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	58 . . .	27 . . .	12 . . .	5 . . .	4 . . .	2 . . .	4 . . .	. .
0-50	11 . . .	2 3.33 50.00 8.70	1 1.67 25.00 5.26	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 1.67 25.00 33.33	0 0.00 0.00 0.00	4 6.67
51-100	3 . . .	0 . . .	0 . . .	0 . . .	0 . . .	0 . . .	0 . . .	0 0.00
101-250	5 . . .	4 6.67 57.14 17.39	2 3.33 28.57 10.53	1 1.67 14.29 12.50	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	7 11.67
251-500	8 . . .	5 8.33 38.46 21.74	3 5.00 23.08 15.79	1 1.67 7.69 12.50	3 5.00 23.08 50.00	0 0.00 0.00 0.00	1 1.67 7.69 100.00	13 21.67
501-1000	1 . . .	8 13.33 44.44 34.78	4 6.67 22.22 21.05	3 5.00 16.67 37.50	2 3.33 11.11 33.33	1 1.67 5.56 33.33	0 0.00 0.00 0.00	18 30.00
>1000	3 . . .	4 6.67 22.22 17.39	9 15.00 50.00 47.37	3 5.00 16.67 37.50	1 1.67 5.56 16.67	1 1.67 5.56 33.33	0 0.00 0.00 0.00	18 30.00
TOTAL	. .	23 38.33	19 31.67	8 13.33	6 10.00	3 5.00	1 1.67	60 100.00

Table 502. Number and percent of institutions awarding various numbers of bachelors degrees in science by percent of faculty using computers for administrative purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

894

89

Science Bachelors Degrees Awarded

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
		Percent of Faculty Having Access to mputers for Instructional Purposes						
.	55	16	22	5	8	1	5	.
	.	.	.	.	.	.	.	.
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
0-50	11	2	1	0	0	1	0	4
	.	3.23	1.61	0.00	0.00	1.61	0.00	6.45
	.	50.00	25.00	0.00	0.00	25.00	0.00	
	.	11.76	4.17	0.00	0.00	100.00	0.00	
51-100	3	0	0	0	0	0	0	0
	.	.	.	.	.	.	.	0.00
	.	.	.	.	.	.	.	
	.	.	.	.	.	.	.	
101-250	5	3	3	1	0	0	0	7
	.	4.84	4.84	1.61	0.00	0.00	0.00	11.29
	.	42.86	42.86	14.29	0.00	0.00	0.00	
	.	17.65	12.50	8.33	0.00	0.00	0.00	
251-500	6	5	5	1	3	0	1	15
	.	8.06	8.06	1.61	4.84	0.00	1.61	24.19
	.	33.33	33.33	6.67	20.00	0.00	6.67	
	.	29.41	20.83	8.33	60.00	0.00	33.33	
501-1000	1	3	8	4	1	0	2	18
	.	4.84	12.90	6.45	1.61	0.00	3.23	29.03
	.	16.67	44.44	22.22	5.56	0.00	11.11	
	.	17.65	33.33	33.33	20.00	0.00	66.67	
>1000	3	4	7	6	1	0	0	18
	.	6.45	11.29	9.68	1.61	0.00	0.00	29.03
	.	22.22	38.89	33.33	5.56	0.00	0.00	
	.	23.53	29.17	50.00	20.00	0.00	0.00	
TOTAL	.	17	24	12	5	1	3	62
	.	27.42	38.71	19.35	8.06	1.61	4.84	100.00

Table 503.- Number and percent of institutions awarding various numbers of bachelors degrees in science by percent of faculty using computers for instructional purposes, as reported by 83 academic vice presidents or deans and 178 heads of science departments in minority higher education institutions.

Percent of Faculty Having Access to Computers for Research Purposes

Science Bachelors Degrees Awarded

FREQUENCY PERCENT ROW PCT COL PCT	.	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	59 . . .	20 . . .	23 . . .	5 . . .	4 . . .	0 . . .	1 . . .	. .
0-50	10 . . .	0 0,00 0,00 0,00	4 6,35 80,00 14,29	0 0,00 0,00 0,00	0 0,00 0,00 0,00	1 1,59 20,00 100,00	0 0,00 0,00 0,00	5 7,94
51-100	3 . . .	0 . . .	0 . . .	0 . . .	0 . . .	0 . . .	0 . . .	0 0,00
101-250	5 . . .	3 4,76 42,86 30,00	1 1,59 14,29 3,57	2 3,17 28,57 11,76	1 1,59 14,29 16,67	0 0,00 0,00 0,00	0 0,00 0,00 0,00	7 11,11
251-500	8 . . .	2 3,17 15,38 20,00	6 9,52 46,15 21,43	4 6,35 30,77 23,53	1 1,59 7,69 16,67	0 0,00 0,00 0,00	0 0,00 0,00 0,00	13 20,63
501-1000	1 . . .	4 6,35 22,22 40,00	8 12,70 44,44 28,57	4 6,35 22,22 23,53	1 1,59 5,56 16,67	0 0,00 0,00 0,00	1 1,59 5,56 100,00	18 28,57
>1000	1 . . .	1 1,59 5,00 10,00	9 14,29 45,00 32,14	7 11,11 35,00 41,18	3 4,76 15,00 50,00	0 0,00 0,00 0,00	0 0,00 0,00 0,00	20 31,75
TOTAL	. .	10 15,87	28 44,44	17 26,98	6 9,52	1 1,59	1 1,59	63 100,00

Table 504. Number and percent of institutions awarding various numbers of bachelors degrees in science by percent of faculty using computers for research purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Science Bachelors Degrees Awarded

FREQUENCY PERCENT ROW PCT COL PCT	Percent of Faculty Having Access to Computers for Games-Experimental Purposes .	0	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%	TOTAL
.	69 . . .	19 . . .	13 . . .	3 . . .	6 . . .	1 . . .	1 . . .	. .
0-50	12 . . .	2 4.17 66.67 8.70	0 0.00 0.00 0.00	1 2.08 33.33 25.00	0 0.00 0.00 0.00	0 . . .	0 . . .	3 6.25
51-100	3 . . .	0 . . .	0 . . .	0 . . .	0 . . .	0 . . .	0 . . .	0 0.00
101-250	5 . . .	2 4.17 28.57 8.70	4 8.33 57.14 21.05	1 2.08 14.29 25.00	0 0.00 0.00 0.00	0 . . .	0 . . .	7 14.58
251-500	11 . . .	5 10.42 50.00 21.74	3 6.25 30.00 15.79	1 2.08 10.00 25.00	1 2.08 10.00 50.00	0 . . .	0 . . .	10 20.83
501-1000	3 . . .	7 14.58 43.75 30.43	7 14.58 43.75 36.84	1 2.08 6.25 25.00	1 2.08 6.25 50.00	0 . . .	0 . . .	16 33.33
>1000	9 . . .	7 14.58 58.33 30.43	5 10.42 41.67 26.32	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 . . .	0 . . .	12 25.00
TOTAL	. .	23 47.92	19 39.58	4 8.33	2 4.17	. .	. .	48 100.00

Table 505. -Number and percent of institutions awarding various numbers of bachelors degrees in science by percent of faculty using computers for games-experimental purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                 S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                21:39 WEDNESDAY, SEPTEMB

                                 TABLE OF SCIMS BY FACADM

SCIMS     NUM SCIENCE MASTER DEGREES 74-79   FACADM    PERC FACULTY USE FOR ADMIN OF CLASSES

FREQUENCY| Percent of Faculty Having Access to Computers for Administrative Purposes
 PERCENT |
 ROW PCT |
 COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     80 |     39 |     18 |      9 |      8 |      3 |      5 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      5 |      1 |      0 |      0 |      0 |      0 |      0 |      1
         |      . |   3.13 |   0.00 |   0.00 |   0.00 |   0.00 |      . |   3.13
         |      . | 100.00 |   0.00 |   0.00 |   0.00 |   0.00 |      . |
         |      . |   9.09 |   0.00 |   0.00 |   0.00 |   0.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      1 |      0 |      0 |      0 |      0 |      0 |      1
         |      . |   3.13 |   0.00 |   0.00 |   0.00 |   0.00 |      . |   3.13
         |      . | 100.00 |   0.00 |   0.00 |   0.00 |   0.00 |      . |
         |      . |   9.09 |   0.00 |   0.00 |   0.00 |   0.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      0 |      1 |      1 |      1 |      0 |      1 |      0 |      4
         |      . |   3.13 |   3.13 |   3.13 |   0.00 |   3.13 |      . |  12.50
         |      . |  25.00 |  25.00 |  25.00 |   0.00 |  25.00 |      . |
         |      . |   9.09 |   7.69 |  25.00 |   0.00 |  50.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
>100     |      3 |      8 |     12 |      3 |      2 |      1 |      0 |     26
         |      . |  25.00 |  37.50 |   9.38 |   6.25 |   3.13 |      . |  81.25
         |      . |  30.77 |  46.15 |  11.54 |   7.69 |   3.85 |      . |
         |      . |  72.73 |  92.31 |  75.00 | 100.00 |  50.00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       11       13        4        2        2        .       32
                .    34.38    40.63    12.50     6.25     6.25        .   100.00
```

Science Masters Degrees Awarded

Table 506. Number and percent of institutions awarding various numbers of masters degrees in science by percent of faculty using computers for administrative purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                        STATISTICAL ANALYSIS SYSTEM
                                                                    21:39 WEDNESDAY, SEPTEMB

                                        TABLE OF SCIMS BY FACINS

         SCIMS     NUM SCIENCE MASTER DEGREES 74-79   FACINS    PERC FACULTY USE FOR CLASS INSTRUCTION

         FREQUENCY| Percent of Faculty Having Access to Computers for Instructional Purposes
          PERCENT |
          ROW PCT |
          COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
         ---------+--------+--------+--------+--------+--------+--------+--------+
               .  |     75 |     26 |     33 |      8 |     12 |      2 |      6 |      .
                  |      . |      . |      . |      . |      . |      . |      . |      .
                  |      . |      . |      . |      . |      . |      . |      . |
                  |      . |      . |      . |      . |      . |      . |      . |
         ---------+--------+--------+--------+--------+--------+--------+--------+
         0-10     |      5 |      1 |      0 |      0 |      0 |      0 |      0 |      1
                  |      . |   3.13 |   0.00 |   0.00 |   0.00 |      . |   0.00 |   3.13
                  |      . | 100.00 |   0.00 |   0.00 |   0.00 |      . |   0.00 |
                  |      . |  14.29 |   0.00 |   0.00 |   0.00 |      . |   0.00 |
         ---------+--------+--------+--------+--------+--------+--------+--------+
         26-50    |      1 |      0 |      1 |      0 |      0 |      0 |      0 |      1
                  |      . |   0.00 |   3.13 |   0.00 |   0.00 |      . |   0.00 |   3.13
                  |      . |   0.00 | 100.00 |   0.00 |   0.00 |      . |   0.00 |
                  |      . |   0.00 |   7.69 |   0.00 |   0.00 |      . |   0.00 |
         ---------+--------+--------+--------+--------+--------+--------+--------+
         51-100   |      0 |      0 |      3 |      1 |      0 |      0 |      0 |      4
                  |      . |   0.00 |   9.38 |   3.13 |   0.00 |      . |   0.00 |  12.50
                  |      . |   0.00 |  75.00 |  25.00 |   0.00 |      . |   0.00 |
                  |      . |   0.00 |  23.08 |  11.11 |   0.00 |      . |   0.00 |
         ---------+--------+--------+--------+--------+--------+--------+--------+
         >100     |      3 |      6 |      9 |      8 |      1 |      0 |      2 |     26
                  |      . |  18.75 |  28.13 |  25.00 |   3.13 |      . |   6.25 |  81.25
                  |      . |  23.08 |  34.62 |  30.77 |   3.85 |      . |   7.69 |
                  |      . |  85.71 |  69.23 |  88.89 | 100.00 |      . | 100.00 |
         ---------+--------+--------+--------+--------+--------+--------+--------+
         TOTAL           .        7       13        9        1        .        2       32
                         .    21.88    40.63    28.13     3.13        .     6.25   100.00
```

Science Masters Degrees Awarded

Table 507. Number and percent of institutions awarding various numbers of masters degrees in science by percent of faculty using computers for instructional purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                        TABLE OF SCIMS BY FACRES

SCIMS     NUM SCIENCE MASTER DEGREES 74-79   FACRES    PERC FACULTY USE FOR RESEARCH

FREQUENCY| Percent of Faculty Having Access to Computers for Research Purposes
 PERCENT |
 ROW PCT |
 COL PCT |        .|        0|1%-20%   |21%-40%  |41%-60%  |61%-80%  |81%-100%|  TOTAL
---------+---------+---------+---------+---------+---------+---------+---------+
      .  |      81 |      26 |      35 |      12 |       6 |       1 |       1 |      .
         |       . |       . |       . |       . |       . |       . |       . |      .
         |       . |       . |       . |       . |       . |       . |       . |
         |       . |       . |       . |       . |       . |       . |       . |
---------+---------+---------+---------+---------+---------+---------+---------+
0-10     |       4 |       0 |       2 |       0 |       0 |       0 |       0 |      2
         |       . |    0,00 |    5.71 |    0,00 |    0,00 |       . |    0,00 |   5,71
         |       . |    0,00 |  100.00 |    0,00 |    0,00 |       . |    0,00 |
         |       . |    0,00 |   12.50 |    0,00 |    0,00 |       . |    0,00 |
---------+---------+---------+---------+---------+---------+---------+---------+
26-50    |       1 |       1 |       0 |       0 |       0 |       0 |       0 |      1
         |       . |    2,86 |    0,00 |    0.00 |    0,00 |       . |    0,00 |   2,86
         |       . |  100,00 |    0,00 |    0,00 |    0,00 |       . |    0,00 |
         |       . |   25,00 |    0,00 |    0,00 |    0,00 |       . |    0,00 |
---------+---------+---------+---------+---------+---------+---------+---------+
51-100   |       0 |       0 |       2 |       2 |       0 |       0 |       0 |      4
         |       . |    0,00 |    5,71 |    5,71 |    0,00 |       . |    0,00 |  11,43
         |       . |    0,00 |   50,00 |   50,00 |    0,00 |       . |    0,00 |
         |       . |    0,00 |   12,50 |   20,00 |    0,00 |       . |    0,00 |
---------+---------+---------+---------+---------+---------+---------+---------+
>100     |       1 |       3 |      12 |       8 |       4 |       0 |       1 |     28
         |       . |    8,57 |   34.29 |   22,86 |   11,43 |       . |    2,86 |  80,00
         |       . |   10,71 |   42.86 |   28,57 |   14,29 |       . |    3,57 |
         |       . |   75,00 |   75,00 |   80,00 |  100,00 |       . |  100,00 |
---------+---------+---------+---------+---------+---------+---------+---------+
TOTAL            .         4        16        10         4         .         1       35
                 .     11,43     45,71     28,57     11,43         .      2,86   100,00
```

Science Masters Degrees Awarded

-642-

Table 508. Number and percent of institutions awarding various numbers of masters degrees in science by percent of faculty using computers for research purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Percent of Faculty Having Access to Computers for Games-Experimental Purposes

Science Masters Degrees Awarded

```
                         TABLE OF SCIMS BY FACGE

SCIMS     NUM SCIENCE MASTER DEGREES 74-79   FACGE     PERC FACULTY USE FOR GAMES-EXPERIMENT

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     95 |     30 |     20 |      7 |      8 |      1 |      1 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      5 |      1 |      0 |      0 |      0 |      0 |      0 |      1
         |      . |   4,17 |   0,00 |      . |      . |      . |      . |   4,17
         |      . | 100,00 |   0,00 |      . |      . |      . |      . |
         |      . |   8,33 |   0,00 |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      1 |      0 |      0 |      0 |      0 |      1
         |      . |   0,00 |   4,17 |      . |      . |      . |      . |   4,17
         |      . |   0,00 | 100,00 |      . |      . |      . |      . |
         |      . |   0,00 |   8,33 |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
51-100   |      1 |      0 |      3 |      0 |      0 |      0 |      0 |      3
         |      . |   0,00 |  12,50 |      . |      . |      . |      . |  12,50
         |      . |   0,00 | 100,00 |      . |      . |      . |      . |
         |      . |   0,00 |  25,00 |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
>100     |     10 |     11 |      8 |      0 |      0 |      0 |      0 |     19
         |      . |  45,83 |  33,33 |      . |      . |      . |      . |  79,17
         |      . |  57,89 |  42,11 |      . |      . |      . |      . |
         |      . |  91,67 |  66,67 |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .       12       12        .        .        .        .       24
                .    50,00    50,00        .        .        .        .   100,00
```

Table 509. Number and percent of institutions awarding various numbers of masters degrees in science by percent of faculty using computers for games-experimental purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF SCID BY FACADM

SCID      NUMBER SCIENCE DOCTORATES 74-79   FACADM    PERC FACULTY USE FOR ADMIN OF CLASSES

FREQUENCY| Percent of Faculty Having Access to Computers for Administrative Purposes
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     82 |     45 |     27 |     11 |     10 |      4 |      5 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      6 |      5 |      4 |      2 |      0 |      1 |      0 |     12
         |      . |  41,67 |  33,33 |  16,67 |      . |   8,33 |      . | 100,00
         |      . |  41,67 |  33,33 |  16,67 |      . |   8,33 |      . |
         |      . | 100,00 | 100,00 | 100,00 |      . | 100,00 |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      0 |      0 |      0 |      0 |      0 |      0
         |      . |      . |      . |      . |      . |      . |      . |   0,00
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        5        4        2        .        1        .       12
                .    41,67    33,33    16,67        .     8,33        .   100,00
```

Science Doctorate Degrees Awarded

Table 510. Number and percent of institutions awarding various numbers of doctorate degrees in science by percent of faculty using computers for administrative purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                          TABLE OF SCID BY FACINS

SCID      NUMBER SCIENCE DOCTORATES 74-79   FACINS    PERC FACULTY USE FOR CLASS INSTRUCTION

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
     .   |     76 |     30 |     42 |     13 |     13 |      2 |      8 |     .
         |      . |      . |      . |      . |      . |      . |      . |     .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      7 |      3 |      4 |      4 |      0 |      0 |      0 |    11
         |      . |  27,27 |  36,36 |  36,36 |      . |      . |      . | 100,00
         |      . |  27,27 |  36,36 |  36,36 |      . |      . |      . |
         |      . | 100,00 | 100,00 | 100,00 |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      0 |      0 |      0 |      0 |      0 |     0
         |      . |      . |      . |      . |      . |      . |      . |  0,00
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        3        4        4        .        .        .      11
                .    27,27    36,36    36,36        .        .        .  100,00
```

Percent of Faculty Having Access to Computers for Instructional Purposes

Science Doctorate Degrees Awarded

Table 511. Number and percent of institutions awarding various numbers of doctorate degrees in science by percent of faculty using computers for instructional purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                          21:39 WEDNESDAY, SEPTEMBER

                         TABLE OF SCID BY FACRES

SCID      NUMBER SCIENCE DOCTORATES 74-79    FACRES    PERC FACULTY USE FOR RESEARCH

FREQUENCY|  Percent of Faculty Having Access to Computers for Research Purposes
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     82 |     30 |     43 |     17 |      9 |      1 |      2 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      4 |      0 |      8 |      5 |      1 |      0 |      0 |     14
         |      . |      . |  57.14 |  35.71 |   7.14 |      . |      . | 100.00
         |      . |      . |  57.14 |  35.71 |   7.14 |      . |      . |
         |      . |      . | 100.00 | 100.00 | 100.00 |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |      1 |      0 |      0 |      0 |      0 |      0 |      0 |      0
         |      . |      . |      . |      . |      . |      . |      . |   0.00
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        .        8        5        1        .        .       14
                .        .    57.14    35.71     7.14        .        .   100.00
```

Science Doctorate Degrees Awarded

Table 512. Number and percent of institutions awarding various numbers of doctorate degrees in science by percent of faculty using computers for research purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
             S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                          21:39 WEDNESDAY SEPTEMBEF

                             TABLE OF SCID BY FACGE

SCID      NUMBER SCIENCE DOCTORATES 74-79    FACGE     PERC FACULTY USE FOR GAMES-EXPERIMENT

FREQUENCY|  Percent of Faculty Having Access to Computers for Games-Experimental Purposes
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
    .    |     100|      39|      28|       7|       8|       1|       1|      .
         |       .|       .|       .|       .|       .|       .|       .|      .
         |       .|       .|       .|       .|       .|       .|       .|
         |       .|       .|       .|       .|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
0-10     |      11|       3|       4|       0|       0|       0|       0|      7
         |       .|   42.86|   57.14|       .|       .|       .|       .| 100.00
         |       .|   42.86|   57.14|       .|       .|       .|       .|
         |       .|  100.00|  100.00|       .|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
26-50    |       1|       0|       0|       0|       0|       0|       0|      0
         |       .|       .|       .|       .|       .|       .|       .|   0.00
         |       .|       .|       .|       .|       .|       .|       .|
         |       .|       .|       .|       .|       .|       .|       .|
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL            .        3        4        .        .        .        .      7
                 .    42.86    57.14        .        .        .        . 100.00
```

Science Doctorate Degrees Awarded

-647-

Table 513. Number and percent of institutions awarding various numbers of doctorate degrees in science by percent of faculty using computers for games-experimental purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                     S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                       21:39 WEDNESDAY, SEPTEMBE

                                    TABLE OF SOTH1 BY FACADM

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79     FACADM     PERC FACULTY USE FOR ADMIN OF CLASSES

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     85 |     40 |     30 |     12 |     10 |      3 |      4 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |      4 |      2 |      1 |      1 |      0 |      2 |      1 |      7
         |      . |  28.57 |  14.29 |  14.29 |      . |  28.57 |  14.29 | 100.00
         |      . |  28.57 |  14.29 |  14.29 |      . |  28.57 |  14.29 |
         |      . | 100.00 | 100.00 | 100.00 |      . | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        2        1        1        .        2        1        7
                .    28.57    14.29    14.29        .    28.57    14.29   100.00
```

Other Science Degrees Awarded

Percent of Faculty Having Access to Computers for Administrative Purposes

Table 514. Number and percent of institutions awarding various numbers of other degrees in science by percent of faculty using computers for administrative purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

Other Science Degrees Awarded

Percent of Faculty Having Access to Computers for Instructional Purposes

```
                    S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                         21:39 WEDNESDAY SEPTEMBE

                                        TABLE OF SOTH1 BY FACINS

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79   FACINS    PERC FACULTY USE FOR CLASS INSTRUCTION

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |     80 |     33 |     43 |     16 |     12 |      1 |      7 |     .
         |      . |      . |      . |      . |      . |      . |      . |     .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |      4 |      0 |      3 |      1 |      1 |      1 |      1 |      7
         |      . |      . |  42.86 |  14.29 |  14.29 |  14.29 |  14.29 | 100.00
         |      . |      . |  42.86 |  14.29 |  14.29 |  14.29 |  14.29 |
         |      . |      . | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        .        3        1        1        1        1        7
                .        .    42.86    14.29    14.29    14.29    14.29   100.00
```

Table 515. Number and percent of institutions awarding various numbers of other degrees in science by percent of faculty using computers for instructional purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                  S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                        21:39 WEDNESDAY, SEPTEMBE

                                      TABLE OF SOTH1 BY FACRES

         SOTH1      N OTHER SCI DEGS NOT SPECIFIED 74-79    FACRES     PERC FACULTY USE FOR RESEARCH

         FREQUENCY|
          PERCENT |
          ROW PCT |
          COL PCT |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
         ---------+--------+--------+--------+--------+--------+--------+--------+
                . |     82 |     29 |     50 |     20 |      9 |      0 |      2 |      .
                  |      . |      . |      . |      . |      . |      . |      . |      .
                  |      . |      . |      . |      . |      . |      . |      . |
                  |      . |      . |      . |      . |      . |      . |      . |
         ---------+--------+--------+--------+--------+--------+--------+--------+
         0-50     |      5 |      1 |      1 |      2 |      1 |      1 |      0 |      6
                  |      . |  16.67 |  16.67 |  33.33 |  16.67 |  16.67 |      . | 100.00
                  |      . |  16.67 |  16.67 |  33.33 |  16.67 |  16.67 |      . |
                  |      . | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |      . |
         ---------+--------+--------+--------+--------+--------+--------+--------+
         TOTAL           .        1        1        2        1        1        .        6
                         .    16.67    16.67    33.33    16.67    16.67        .   100.00
```

Percent of Faculty Having Access to Computers for Research Purposes

Other Science Degrees Awarded

Table 516, Number and percent of institutions awarding various numbers of other degrees in science by percent of faculty using computers for research purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                    S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                            21:39 WEDNESDAY  EPTEMBE

                                   TABLE OF SOTH1 BY FACGE

SOTH1      N OTHER SCI DEGS-NOT SPECIFIED 74-79    FACGE      PERC FACULTY USE FOR GAMES-EXPERIMENT

FREQUENCY|  Percent of Faculty Having Access to Computers for Games-Experimental Purposes
PERCENT  |
ROW PCT  |
COL PCT  |       .|       0|1%-20%  |21%-40% |41%-60% |61%-80% |81%-100%|  TOTAL
---------+--------+--------+--------+--------+--------+--------+--------+
       . |    106 |     42 |     30 |      6 |      8 |      0 |      0 |      .
         |      . |      . |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+--------+--------+
0-50     |      6 |      0 |      2 |      1 |      0 |      1 |      1 |      5
         |      . |      . |  40.00 |  20.00 |      . |  20.00 |  20.00 | 100.00
         |      . |      . |  40.00 |  20.00 |      . |  20.00 |  20.00 |
         |      . |      . | 100.00 | 100.00 |      . | 100.00 | 100.00 |
---------+--------+--------+--------+--------+--------+--------+--------+
TOTAL           .        .        2        1        .        1        1        5
                .        .    40.00    20.00        .    20.00    20.00   100.00
```

Other Science Degrees Awarded

Table 517. Number and percent of institutions awarding various numbers of other degrees in science by percent of faculty using computers for games-experimental purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

computers for academic purposes cannot be determined because sample sizes are too small.

P. Relationships between Science Degree Productivity and Efforts to Improve Academic Computing Capabilities

The tables discussed in this section illustrate relationships between the productivity of minority higher education institutions in awarding degrees in the sciences, and two indicators of institutional efforts to improve their academic computing capabilities. These latter indicators are the same ones described in Section L, above.

From Tables 518 and 519 we see that there is a moderately higher probability that campus-wide computing study groups have met in institutions that award greater numbers of associate degrees in the sciences, and that an institution's production of associate degrees in the sciences is virtually unrelated to the probability that departmental committees of science faculty have met to discuss the improvement of academic computing. Contingency coefficients associated with these tables equal 0.39 and 0.38, respectively.

There is a moderately higher probability that campus-wide computing study groups will have met in institutions that award larger numbers of bachelors degrees in the sciences (Table 520; associated contingency coefficient equals 0.36). However, an institution's production of bachelors degrees in science appears to be unrelated to the probability that departmental computing study groups will have met (Table 521; associated contingency coefficient equals 0.32).

There is a slightly higher probability that campus-wide computing study groups will have met in minority institutions that award a larger number of masters degrees in the sciences (See Table 522 and note the associated contingency coefficient of 0.52), but a somewhat lower probability that

```
                   S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                                                                -653-        21:36

                                    TABLE OF SCIAA BY CWSG

                      SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79   CWSG        C

                      FREQUENCY| Campus-Wide Computer Groups Have Met
                       PERCENT |
                       ROW PCT |
                       COL PCT |    .    |YES     |NO      |  TOTAL
                      ---------+---------+--------+--------+
                             . |       1 |     30 |     11 |      .
                               |       . |      . |      . |      .
                               |       . |      . |      . |
                               |       . |      . |      . |
                      ---------+---------+--------+--------+
                      0-50     |       0 |     12 |     13 |     25
                               |       . |  31.58 |  34.21 |  65.79
                               |       . |  48.00 |  52.00 |
                               |       . |  54.55 |  81.25 |
                      ---------+---------+--------+--------+
                      51-100   |       0 |      4 |      0 |      4
                               |       . |  10.53 |   0.00 |  10.53
                               |       . | 100.00 |   0.00 |
                               |       . |  18.18 |   0.00 |
                      ---------+---------+--------+--------+
                      101-250  |       0 |      4 |      2 |      6
                               |       . |  10.53 |   5.26 |  15.79
                               |       . |  66.67 |  33.33 |
                               |       . |  18.18 |  12.50 |
                      ---------+---------+--------+--------+
                      251-500  |       1 |      2 |      0 |      2
                               |       . |   5.26 |   0.00 |   5.26
                               |       . | 100.00 |   0.00 |
                               |       . |   9.09 |   0.00 |
                      ---------+---------+--------+--------+
                      >1000    |       2 |      0 |      1 |      1
                               |       . |   0.00 |   2.63 |   2.63
                               |       . |   0.00 | 100.00 |
                               |       . |   0.00 |   6.25 |
                      ---------+---------+--------+--------+
                      TOTAL            .       22       16       38
                                       .    57.89    42.11   100.00
```

Science Associate Degrees Awarded

Table 518. Number and percent of institutions awarding various numbers of associate degrees in science, by institutions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                         TABLE OF SCIAA BY STUD

SCIAA     NUM SCIENCE ASSOCIATE DEGREES 74-79    STUD       DEPT STUDY

FREQUENCY| Departmental Computer Groups Have Met
PERCENT  |
ROW PCT  |
COL PCT  |         |YES     |NO      |DO  NOT |PRES FAC|
         |        .|        |        | KNOW   | EXCEL  |  TOTAL
---------+---------+--------+--------+--------+--------+
        .|        9|      74|      41|       7|       1|       .
         |        .|       .|       .|       .|       .|       .
         |        .|       .|       .|       .|       .|
         |        .|       .|       .|       .|       .|
---------+---------+--------+--------+--------+--------+
0-50     |       12|      14|      10|       0|       0|      24
         |        .|   25.93|   18.52|    0.00|       .|   44.44
         |        .|   58.33|   41.67|    0.00|       .|
         |        .|   42.42|   55.56|    0.00|       .|
---------+---------+--------+--------+--------+--------+
51-100   |        3|       1|       1|       0|       0|       2
         |        .|    1.85|    1.85|    0.00|       .|    3.70
         |        .|   50.00|   50.00|    0.00|       .|
         |        .|    3.03|    5.56|    0.00|       .|
---------+---------+--------+--------+--------+--------+
101-250  |        1|       9|       3|       0|       0|      12
         |        .|   16.67|    5.56|    0.00|       .|   22.22
         |        .|   75.00|   25.00|    0.00|       .|
         |        .|   27.27|   16.67|    0.00|       .|
---------+---------+--------+--------+--------+--------+
251-500  |        0|       7|       3|       2|       0|      12
         |        .|   12.96|    5.56|    3.70|       .|   22.22
         |        .|   58.33|   25.00|   16.67|       .|
         |        .|   21.21|   16.67|   66.67|       .|
---------+---------+--------+--------+--------+--------+
>1000    |        1|       2|       1|       1|       0|       4
         |        .|    3.70|    1.85|    1.85|       .|    7.41
         |        .|   50.00|   25.00|   25.00|       .|
         |        .|    6.06|    5.56|   33.33|       .|
---------+---------+--------+--------+--------+--------+
TOTAL             .       33       18        3        .       54
                  .    61.11    33.33     5.56        .   100.00
```

Science Associate Degrees Awarded

Table 519 . Number and percent of institutions awarding various numbers of associate degrees in science, by institutions reporting departmental groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                 STATISTICAL ANALYSIS SYSTEM                       21:36

                          TABLE OF SCIBS BY CWSG

      SCIBS     NUM SCIENCE BACHELOR DEGREES 74-79   CWSG        CA

      FREQUENCY|  Campus-Wide Computer Groups Have Met
      PERCENT  |
      ROW PCT  |
      COL PCT  |  .     |YES     |NO      |  TOTAL
      ---------+--------+--------+--------+
             . |      3 |     20 |     18 |      .
               |      . |      . |      . |      .
               |      . |      . |      . |
               |      . |      . |      . |
      ---------+--------+--------+--------+
      0-50     |      0 |      4 |      4 |      8
               |      . |   9.76 |   9.76 |  19.51
               |      . |  50.00 |  50.00 |
               |      . |  12.50 |  44.44 |
      ---------+--------+--------+--------+
      51-100   |      0 |      2 |      1 |      3
               |      . |   4.88 |   2.44 |   7.32
               |      . |  66.67 |  33.33 |
               |      . |   6.25 |  11.11 |
      ---------+--------+--------+--------+
      101-250  |      0 |      7 |      2 |      9
               |      . |  17.07 |   4.88 |  21.95
               |      . |  77.78 |  22.22 |
               |      . |  21.88 |  22.22 |
      ---------+--------+--------+--------+
      251-500  |      0 |      9 |      1 |     10
               |      . |  21.95 |   2.44 |  24.39
               |      . |  90.00 |  10.00 |
               |      . |  28.13 |  11.11 |
      ---------+--------+--------+--------+
      501-1000 |      1 |      5 |      1 |      6
               |      . |  12.20 |   2.44 |  14.63
               |      . |  83.33 |  16.67 |
               |      . |  15.63 |  11.11 |
      ---------+--------+--------+--------+
      >1000    |      0 |      5 |      0 |      5
               |      . |  12.20 |   0.00 |  12.20
               |      . | 100.00 |   0.00 |
               |      . |  15.63 |   0.00 |
      ---------+--------+--------+--------+
      TOTAL           .       32        9       41
                      .    78.05    21.95   100.00
```

Science Bachelors Degrees Awarded

Table 520. Number and percent of institutions awarding various numbers of bachelors degrees in science, by institutions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                    S T A T I S T I C A L   A N A L Y S I S   S Y S T E M                 21:39

                                     TABLE OF SCIBS BY STUD

              SCIBS      NUM SCIENCE BACHELOR DEGREES 74-79    STUD      DEPT STUD

              FREQUENCY|          Departmental Computer Groups Have Met
               PERCENT |
               ROW PCT |
               COL PCT |         |YES      |NO       |DO  NOT  |PRES FAC|
                       |        .|         |         | KNOW    | EXCEL  |   TOTAL
              ---------+---------+---------+---------+---------+--------+
                     . |      14 |      56 |      37 |       4 |      1 |      .
                       |       . |       . |       . |       . |      . |      .
                       |       . |       . |       . |       . |      . |
                       |       . |       . |       . |       . |      . |
              ---------+---------+---------+---------+---------+--------+
              0-50     |       3 |       7 |       4 |       1 |      0 |     12
                       |       . |    8.86 |    5.06 |    1.27 |      . |  15.19
                       |       . |   58.33 |   33.33 |    8.33 |      . |
                       |       . |   13.73 |   18.18 |   16.67 |      . |
              ---------+---------+---------+---------+---------+--------+
              51-100   |       1 |       2 |       0 |       0 |      0 |      2
                       |       . |    2.53 |    0.00 |    0.00 |      . |   2.53
                       |       . |  100.00 |    0.00 |    0.00 |      . |
                       |       . |    3.92 |    0.00 |    0.00 |      . |
              ---------+---------+---------+---------+---------+--------+
              101-250  |       4 |       5 |       1 |       2 |      0 |      8
                       |       . |    6.33 |    1.27 |    2.53 |      . |  10.13
                       |       . |   62.50 |   12.50 |   25.00 |      . |
                       |       . |    9.80 |    4.55 |   33.33 |      . |
              ---------+---------+---------+---------+---------+--------+
              251-500  |       3 |      10 |       7 |       1 |      0 |     18
                       |       . |   12.66 |    8.86 |    1.27 |      . |  22.78
                       |       . |   55.56 |   38.89 |    5.56 |      . |
                       |       . |   19.61 |   31.82 |   16.67 |      . |
              ---------+---------+---------+---------+---------+--------+
              501-1000 |       0 |      15 |       4 |       0 |      0 |     19
                       |       . |   18.99 |    5.06 |    0.00 |      . |  24.05
                       |       . |   78.95 |   21.05 |    0.00 |      . |
                       |       . |   29.41 |   18.18 |    0.00 |      . |
              ---------+---------+---------+---------+---------+--------+
              >1000    |       1 |      12 |       6 |       2 |      0 |     20
                       |       . |   15.19 |    7.59 |    2.53 |      . |  25.32
                       |       . |   60.00 |   30.00 |   10.00 |      . |
                       |       . |   23.53 |   27.27 |   33.33 |      . |
              ---------+---------+---------+---------+---------+--------+
              TOTAL            .        51        22         6        .       79
                               .     64.56     27.85      7.59        .   100.00
```

Science Bachelors Degrees Awarded

Table 521. Number and percent of institutions awarding various numbers of bachelors degrees in science, by institutions reporting departmental groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                         TABLE OF SCIMS BY CWSG

SCIMS     NUM SCIENCE MASTER DEGREES 74-79   CWSG            CAM

FREQUENCY| Campus-Wide Computer Groups Have Met
PERCENT  |
ROW PCT  |
COL PCT  |       .|YES     |NO      |  TOTAL
---------+--------+--------+--------+
       .  |      4 |     40 |     24 |      .
          |      . |      . |      . |      .
          |      . |      . |      . |
          |      . |      . |      . |
---------+--------+--------+--------+
0-10      |      0 |      2 |      2 |      4
          |      . |  13.33 |  13.33 |  26.67
          |      . |  50.00 |  50.00 |
          |      . |  16.67 |  66.67 |
---------+--------+--------+--------+
26-50     |      0 |      2 |      0 |      2
          |      . |  13.33 |   0.00 |  13.33
          |      . | 100.00 |   0.00 |
          |      . |  16.67 |   0.00 |
---------+--------+--------+--------+
51-100    |      0 |      1 |      1 |      2
          |      . |   6.67 |   6.67 |  13.33
          |      . |  50.00 |  50.00 |
          |      . |   8.33 |  33.33 |
---------+--------+--------+--------+
>100      |      0 |      7 |      0 |      7
          |      . |  46.67 |   0.00 |  46.67
          |      . | 100.00 |   0.00 |
          |      . |  58.33 |   0.00 |
---------+--------+--------+--------+
TOTAL            .       12        3       15
                 .    80.00    20.00   100.00
```

Science Masters Degrees Awarded

Table 522. Number and percent of institutions awarding various numbers of masters degrees in science, by institutions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

departmental computing study groups will have met (See Table 523 and note the associated contingency coefficient of 0.33). Both of these relationships should be regarded as tentative, since the marginal distribution of the numbers of science masters degrees awarded results in some very small sample sizes.

Relationships between institutional efforts to improve academic computing and the productivity of minority institutions in awarding doctoral degrees in the sciences and "other science degrees" are illustrated in Tables 524 through 527. Because sample sizes are so small, these relationships must be regarded as indeterminate.

Q. Summary

The 366 tables discussed in Section VI, when viewed collectively, present compelling evidence of relational linkages between education in the sciences at minority higher education institutions, and the opportunities of science faculty and students at those institutions to engage in academic computing. In the sample of institutions for which we have data, it is clear that larger and more productive programs in the sciences generally go together with science students and faculty who have greater access to academic computing, are better prepared to engage in academic computing, and are more likely to take advantage of their preparation and access.

Unfortunately, we have no basis for concluding either that more science causes more academic computing, or that the reverse is true. External studies of instructional computing have shown that the learning of some students is greatly facilitated by their opportunities to interact with computers during the learning process. On the basis of these studies, one might argue that more computing causes better learning in science. Conversely, logic would support the argument that better-prepared science faculty are likely to be more productive as scholars and researchers, and are therefore more likely to

```
                         TABLE OF SCIMS BY STUD

SCIMS     NUM SCIENCE MASTER DEGREES 74-79   STUD      DEPT STUDY

FREQUENCY|        Departmental Computer Groups Have Met
PERCENT  |
ROW PCT  |
COL PCT  |        |YES     |NO      |DO  NOT |PRES FAC|
         |       .|        |        | KNOW   | EXCEL  |  TOTAL
---------+--------+--------+--------+--------+--------+
       .  |     21 |     82 |     50 |      8 |      1 |      .
         |      . |      . |      . |      . |      . |      .
         |      . |      . |      . |      . |      . |
         |      . |      . |      . |      . |      . |
---------+--------+--------+--------+--------+--------+
0-10     |      3 |      3 |      0 |      0 |      0 |      3
         |      . |   8,33 |   0,00 |   0,00 |      . |   8,33
         |      . | 100,00 |   0,00 |   0,00 |      . |
         |      . |  12,00 |   0,00 |   0,00 |      . |
---------+--------+--------+--------+--------+--------+
26-50    |      1 |      1 |      0 |      0 |      0 |      1
         |      . |   2,78 |   0,00 |   0,00 |      . |   2,78
         |      . | 100,00 |   0,00 |   0,00 |      . |
         |      . |   4,00 |   0,00 |   0,00 |      . |
---------+--------+--------+--------+--------+--------+
51-100   |      0 |      4 |      0 |      0 |      0 |      4
         |      . |  11,11 |   0,00 |   0,00 |      . |  11,11
         |      . | 100,00 |   0,00 |   0,00 |      . |
         |      . |  16,00 |   0,00 |   0,00 |      . |
---------+--------+--------+--------+--------+--------+
>100     |      1 |     17 |      9 |      2 |      0 |     28
         |      . |  47,22 |  25,00 |   5,56 |      . |  77,78
         |      . |  60,71 |  32,14 |   7,14 |      . |
         |      . |  68,00 | 100,00 | 100,00 |      . |
---------+--------+--------+--------+--------+--------+
TOTAL           .       25        9        2        .       36
                .    69,44    25,00     5,56        .   100,00
```

Science Masters Degrees Awarded

Table 523. Number and percent of institutions awarding various numbers of masters degrees in science, by institutions reporting departmental groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                    TABLE OF SCID BY CWSG

SCID      NUMBER SCIENCE DOCTORATES 74-79   CWSG

FREQUENCY|  Campus-Wide Computer Groups Have Met
PERCENT  |
ROW PCT  |
COL PCT  | .      |YES     |NO      |  TOTAL
---------+--------+--------+--------+
      .  |      4 |     47 |     25 |       .
         |      . |      . |      . |       .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-10     |      0 |      4 |      2 |       6
         |      . |  57.14 |  28.57 |   85.71
         |      . |  66.67 |  33.33 |
         |      . |  80.00 | 100.00 |
---------+--------+--------+--------+
26-50    |      0 |      1 |      0 |       1
         |      . |  14.29 |   0.00 |   14.29
         |      . | 100.00 |   0.00 |
         |      . |  20.00 |   0.00 |
---------+--------+--------+--------+
TOTAL           .        5        2        7
                .    71.43    28.57   100.00
```

Science Doctorate Degrees Awarded

Table 524. Number and percent of institutions awarding various numbers of doctorate degrees in science, by institutions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

Departmental Computer Groups Have Met

Science Doctorate Degrees Awarded

```
                          TABLE OF SCID BY STUD

SCID       NUMBER SCIENCE DOCTORATES 74-79    STUC       DEPT STUDY

FREQUENCY|
PERCENT  |
ROW PCT  |
COL PCT  |         |YES     |NO      |DO  NOT |PRES FAC|
         |        .|        |        | KNOW   | EXCEL  |  TOTAL
---------+---------+--------+--------+--------+--------+
       . |     22  |     95 |     57 |      9 |      1 |      .
         |      .  |      . |      . |      . |      . |      .
         |      .  |      . |      . |      . |      . |
         |      .  |      . |      . |      . |      . |
---------+---------+--------+--------+--------+--------+
0-10     |      3  |     12 |      2 |      1 |      0 |     15
         |      .  |  80.00 |  13.33 |   6.67 |      . | 100.00
         |      .  |  80.00 |  13.33 |   6.67 |      . |
         |      .  | 100.00 | 100.00 | 100.00 |      . |
---------+---------+--------+--------+--------+--------+
26-50    |      1  |      0 |      0 |      0 |      0 |      0
         |      .  |      . |      . |      . |      . |   0.00
         |      .  |      . |      . |      . |      . |
         |      .  |      . |      . |      . |      . |
---------+---------+--------+--------+--------+--------+
TOTAL           .        12        2        1        .       15
                .     80.00    13.33     6.67        .   100.00
```

Table 525. Number and percent of institutions awarding various numbers of doctorate degrees in science, by institutions reporting departmental groups having met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

```
                 TABLE OF SOTH1 BY CWSG

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79   CWSG

FREQUENCY|  Campus-Wide Computer Groups Have Met
PERCENT  |
ROW PCT  |
COL PCT  |  .     |YES     |NO      |  TOTAL
---------+--------+--------+--------+
       . |      4 |     48 |     22 |      .
         |      . |      . |      . |      .
         |      . |      . |      . |
         |      . |      . |      . |
---------+--------+--------+--------+
0-50     |      0 |      4 |      5 |      9
         |      . |  44.44 |  55.56 | 100.00
         |      . |  44.44 |  55.56 |
         |      . | 100.00 | 100.00 |
---------+--------+--------+--------+
TOTAL           .        4        5        9
                .    44.44    55.56   100.00
```

Other Science Degrees Awarded

Table 526. Number and percent of institutions awarding various numbers of other degrees in science, by institutions reporting campus-wide groups having met to study the acquisition or improvement of computer facilities for instructional purposes, as reported by 83 academic vice presidents or deans in minority higher education institutions.

```
                                TABLE OF SOTH1 BY STUC

SOTH1     N OTHER SCI DEGS NOT SPECIFIED 74-79     STUC        DEPT S

FREQUENCY|    Departmental Computer Groups Have Met
PERCENT  |
ROW PCT  |
COL PCT  |       |YES     |NO      |DO  NOT |PRES FAC|
         |      .|        |        |  KNOW  | EXCEL  |  TOTAL
---------+-------+--------+--------+--------+--------+
       . |     23|     102|      56|      10|       1|      .
         |      .|       .|       .|       .|       .|      .
         |      .|       .|       .|       .|       .|
         |      .|       .|       .|       .|       .|
---------+-------+--------+--------+--------+--------+
0-50     |      3|       5|       3|       0|       0|      8
         |      .|   62.50|   37.50|       .|       .| 100.00
         |      .|   62.50|   37.50|       .|       .|
         |      .|  100.00|  100.00|       .|       .|
---------+-------+--------+--------+--------+--------+
TOTAL           .       5        3        .        .      8
                .   62.50    37.50        .        . 100.00
```

Other Science Degrees Awarded

Table 527. Number and percent of institutions awarding various numbers of other degrees in science, by institutions reporting departmental groups having met to study the acquisition or improvement of computer facilities for instructional purposes, as reported by 83 academic vice presidents or deans, and 178 heads of science departments in minority higher education institutions.

use computers for academic purposes. So it may just as well be the case that better science causes more academic computing. Whatever the direction of cause, and regardless of the existence of causal relationships, it seems clear from the data examined here that extensive, productive science programs are relatively rare in responding minority institutions that do not also provide good opportunities for academic computing.

NEEDS SURVEY

ON EDUCATIONAL COMPUTING IN MINORITY INSTITUTIONS

PRESIDENT OR CHANCELLOR

Please print or type NAME ______________________________

TELEPHONE ____________ TITLE ______________________________
Area code/No.

INSTITUTION ______________________________

QUESTIONS 1-9 *seek your judgments on the status of academic computing that would be realistically desirable for your institution by the 1981-1982 academic year. In answering these questions, please consider your institution's present mission and its likely future development. RESPONSES TO EACH OF THESE QUESTIONS SHOULD TOTAL 100%.*

1. In your judgment, by 1981-82 what percentage of students enrolled at your institution should have computing skills at each of the following levels in order to be able to perform successfully AS STUDENTS?

A. _____% No computer training or skills

B. _____% General awareness of computers (a single course about the role of computers in society, but little or no personal use of a computer)

C. _____% Limited personal computer use and skill (use of others' computer programs and instructional materials on a computer, but no computer programming skills)

D. _____% Ability to program a computer and programming experience (at least one course in computer programming or equivalent personal experience)

100%

2. In your judgment, by 1981-82 what percentage of students enrolled at your institution should have computing skills at each of the following levels in order to perform successfully IN LIFE after they graduate?

A. _____% No computer training or skills

B. _____% General awareness of computers (a single course about the role of computers in society, but little or no personal use of a computer)

C. _____% Limited personal computer use and skill (use of others' computer programs and instructional materials on a computer, but no computer programming skills)

D. _____% Ability to program a computer and programming experience (at least one course in computer programming or equivalent personal experience)

100%

3. In your judgment, by 1981-82 what percentage of students enrolled at your institution should have access to computers at each of the following levels, in order to complete their classwork and homework assignments?

A. _____% No access to computers for classwork or homework

B. _____% Limited access to computers for classwork or homework (in one or two classes per academic year)

C. _____% Moderate access to computers for classwork or homework (in 3-5 classes per academic year)

D. _____% Unlimited access to computers for classwork or homework

100%

4. In your judgment, by 1981-82 what percentage of students enrolled at your institution should use computers in conjunction with their independent research at each of the following levels?

A. _____% No computer use for independent research

B. _____% Limited computer use for independent research (less than two weeks of computer work for this purpose per academic year)

C. _____% Moderate computer use for independent research (2-8 weeks of computer work for this purpose per academic year)

D. _____% Substantial computer use for independent research (more than 8 weeks of computer use for this purpose per academic year)

100%

5. In your judgment, by 1981-82 what percent of your teaching faculty should have access to computers at each of the following levels, for administrative use in their classes (e.g., recording students' progress, scoring tests, storing test items, etc.)?

A. _____% No access to computers for administrative use in classes

B. _____% Limited access to computers for administrative use in classes (in one or two classes per academic year)

C. _____% Moderate access to computers for administrative use in classes (in 3-4 classes per academic year)

D. _____% Unlimited access to computers for administrative use in classes (in more than 4 classes per academic year)

100%

6. In your judgment, by 1981-82 what percentage of your teaching faculty should have access to computers at each of the following levels, for instructional use in their classes (e.g., demonstrating solutions to problems, conducting simulations, etc.)?

A. _____% No access to computers for instructional use in classes

B. _____% Limited access to computers for instructional use in classes (in one or two classes per academic year)

C. _____% Moderate access to computers for instructional use in classes (in 3-4 classes per academic year)

D. _____% Unlimited access to computers for instructional use in classes (in more than 4 classes per academic year)

100%

7. In your judgment, by 1981-82 what percentage of your teaching faculty should use computers in conjunction with their independent research at each of the following levels?

A. _____% No computer use for independent research
B. _____% Limited computer use for independent research (at most, in one research study per academic year)
C. _____% Moderate computer use for academic research (in more than one but less than three research studies per academic year)
D. _____% Substantial computer use for independent research (in more than three research studies per academic year)
100%

8. In your judgment, by 1981-82 should students at your institution have access to computers for unscheduled activities such as experimentation and games?

Yes _____

No _____

9. In your judgment, by 1981-82 should teaching faculty at your institution have access to computers for unscheduled activities such as experimentation and games?

Yes _____

No _____

QUESTIONS 10-13 *seek your judgments on the academic orientation of your institution.*

10. Which of the following statements best describes your institution? *(Mark only one answer):*

A. _____ Arts are emphasized more than sciences.
B. _____ Sciences are emphasized more than arts.
C. _____ Arts and sciences are emphasized equally.

11. Which of the following statements best describes your institution? *(Mark only one answer):*

A. _____ Undergraduate education is emphasized more than graduate education.
B. _____ Graduate education is emphasized more than undergraduate education.
C. _____ Undergraduate and graduate education are emphasized equally.

12. Rate each of the following educational activities in terms of importance at your institution. *(Mark one answer for each activity):*

A. CAREER TRAINING OF UNDERGRADUATES

_____ Most important activity at our institution
_____ Very important activity
_____ Moderately important activity
_____ Unimportant activity
_____ Does not exist at our institution

B. LIBERAL ARTS EDUCATION OF UNDERGRADUATES

_____ Most important activity at our institution
_____ Very important activity
_____ Moderately important activity
_____ Unimportant activity
_____ Does not exist at our institution

C. PROFESSIONAL EDUCATION OF GRADUATE STUDENTS (e.g., teaching, law, medicine, etc.)

_____ Most important activity at our institution
_____ Very important activity
_____ Moderately important activity
_____ Unimportant activity
_____ Does not exist at our institution

D. LIBERAL ARTS EDUCATION OF GRADUATE STUDENTS

_____ Most important activity at our institution
_____ Very important activity
_____ Moderately important activity
_____ Unimportant activity
_____ Does not exist at our institution

E. ADULT EDUCATION

_____ Most important activity at our institution
_____ Very important activity
_____ Moderately important activity
_____ Unimportant activity
_____ Does not exist at our institution

F. OTHER (Specify: ____)

_____ Most important activity at our institution
_____ Very important activity
_____ Moderately important activity
_____ Unimportant activity

13. When a faculty member is considered for promotion at your institution, which of the following statements best describes consideration of his or her performance?

A. _____ Teaching performance is given greatest consideration.
B. _____ Published research is given greatest consideration.
C. _____ Teaching and published research are considered equally.
D. _____ Other (specify: ____).

FOR QUESTIONS 14-21, *Please place a check over the response that best reflects your opinion of each statement. (Mark ONE response for EACH statement):*

14. Many students would (or do) benefit from a computer science program at this institution.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

15. A computer science curriculum at this institution would (or does) attract many good students.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

16. Computer-assisted instruction has little value in higher education.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

17. The quality of faculty research at this institution is (or would be) enhanced by the use of computers.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

18. In allocating institutional funds, instructional computing should be given low priortiy.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

19. A science program is essential at this institution.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

20. All bachelor's degree students at this institution should take at least one science course.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

21. Science is not important for undergraduates in career training programs at this institution.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

22. Does your institution have a long-range plan for improvement of academic computing? *(NOTE: Academic computing includes such activities as instruction, research, etc.; it does not include computing for administrative purposes such as registration, course scheduling, etc.)*

_____ Yes

_____ No *(If you marked NO, please go to question 24.)*

23. Which of the following are explicitly considered in your institution's long-range plan for improvement of academic computing? *(Mark "Yes" or "No" for each.)* *(If you marked NO for 22, do not answer this question.)*

A. ___Yes ___No Computer hardware needs (machines, etc.)
B. ___Yes ___No Academic software needs (programs, languages, etc.)
C. ___Yes ___No Computing personnel
D. ___Yes ___No Computer facilities (space)
E. ___Yes ___No Training of faculty, staff, or students
F. ___Yes ___No Other (Please specify: ______________________________)

Many institutions are subject to external constraints, pressures, or forces that hamper development or improvement of academic computing capabilities and facilities. The following questions seek information on the existence and/or influence of such forces at your institution.

24. In your judgment, do forces external to your institution hamper the development or improvement of academic computing at your institution?

_____ Yes *If you marked "NO," please go to the*
_____ No *instructions at the end of this questionnaire.*

25. Does the federal government specifically hamper the development of academic computing at your institution in any of the following ways? *(Mark "Yes" or "No" for each.)*

A. ___Yes ___No By discouraging purchase of hardware, where funding is available for academic computing
B. ___Yes ___No By discouraging lease or rental of hardware, where funding is available for academic computing
C. ___Yes ___No By providing funds for everything but personnel
D. ___Yes ___No By placing unnecessary bureaucratic roadblocks in the way of your institution, even where funds are available for academic computing
E. ___Yes ___No In other ways (Specify: ________________________)

26. Does your state government specifically hamper the development of academic computing at your institution in any of the following ways?

A. ___Yes ___No By not allowing individual institutions to acquire computing hardware on their own
B. ___Yes ___No By politically deciding which institutions can acquire hardware and which can't
C. ___Yes ___No In other ways (Specify: __________________________)

27. Do local government or community forces hamper the development of academic computing at your institution in any way?

___Yes ___No If you marked "Yes," please explain: ________________

____

____

____

28. Do any other external forces, pressures or constraints hamper the development of academic computing at your institution?

___Yes ___No If you marked "Yes," please explain: ________________

____

____

____

Please check to make sure that you have answered all the questions that pertain to your institution. Thank you for your cooperation.

Please place the completed questionnaire in the stamped, self-addressed envelope provided, and mail it immediately.

NEEDS SURVEY

ON EDUCATIONAL COMPUTING IN MINORITY INSTITUTIONS

ACADEMIC COMPUTING DIRECTOR

(OR PERSON MOST KNOWLEDGEABLE ABOUT ACADEMIC COMPUTING ON CAMPUS)

Please print or type NAME ______________________________

TELEPHONE: TITLE ______________________________

______________ DEPARTMENT ______________________________
Area code and number

INSTITUTION ______________________________

QUESTIONS 1-31 *seek information on the current status, use, and quality of academic computing at your institution.*

1. Does your institution have, or have access to, a computer that is used solely or in part for academic purposes?

   NOTE: Academic computing includes only computer work in support of the academic program of the institution; e.g., instruction, research, etc. It does not include computing for administrative purposes of the institution, such as registration, course scheduling, etc. It may, however, include administrative work by an instructor in support of classroom activities, such as keeping track of student progress, test scoring, storing of test items, etc.

   _____ Yes _____ No *IF YOU MARKED "NO," PLEASE GO TO QUESTION 31.*

2. Does your insitution make computer facilities accessible to students?

   UNDERGRADUATES: _____ Yes _____ No
   GRADUATE STUDENTS: _____ Yes _____ No

   If the answer to Question 2 is "No" for both undergraduates and graduate students, go to Question 4.

3. What percentage of students currently enrolled in your institution use computers for the following activities? *(NOTE: Percentages might NOT sum to 100%.)*

   A. _____ % Learning about computers and computer programming
   B. _____ % Computer-assisted instruction (using computers to learn subject matter)
   C. _____ % Problem solving in their courses
   D. _____ % As a tool in their research
   E. _____ % Games or experimentation (excluding coursework)
   F. _____ % Other (Specify: ______________________________)

4. Does your institution make computer facilities accessible to faculty?

_____ Yes

_____ No *If the answer to Question 4 is "No," go to Question 6.*

5. What percentage of faculty members in your institution use computers for the following activities? *(NOTE: Percentages might NOT sum to 100%.)*

A. _____ % Facilitating administration of classes (e.g., recording students' progress, scoring tests, storing test items, etc.)

B. _____ % Facilitating instruction in classes (e.g., demonstrating solutions to problems, conducting simulations, etc.)

C. _____ % As a tool in their research

D. _____ % Games or experimentation

E. _____ % Other (Specify: ______________________________)

6. Does your institution use a central computer or one or more personal (micro) computers, or both, for academic computing?

A. _____ % Central computer(s) only

B. _____ % Personal computer(s) only *If you marked Option B, go to Ques. 9.*

C. _____ % Both central computer(s) and personal computer(s)

D. _____ % Don't know *If you marked Option D, go to Question 9.*

7. Is (are) the central computer(s) which is (are) used for academic computing located on the campus of your institution?

A. _____ Yes, on campus

B. _____ No, not on campus

C. _____ Both on and off campus

D. _____ Don't know

If the answer to Question 7 is "Yes, on campus," go to Question 9.

8. What is the location of the central computer which is used by your institution for academic computing? *(Mark the appropriate options):*

A. _____ Off campus at a commercial data processing company

B. _____ At the main office of the computer network to which the institution belongs

C. _____ At some other non-commercial institution (e.g., another higher education institution, a government agency, etc.)

D. _____ Other (Specify: ______________________________)

E. _____ Don't know

9. What computers does your institution use for academic purposes?

A. ______________________________ / __________
Manufacturer Model No. Number of units

B. ______________________________ / __________
Manufacturer Model No. Number of units

C. ______________________________ / __________
Manufacturer Model No. Number of units

D. ______________________________ / __________
Manufacturer Model No. Number of units

E. ______________________________ / __________
Manufacturer Model No. Number of units

F. ______________________________ / __________
Manufacturer Model No. Number of units

G. ______________________________ / __________
Manufacturer Model No. Number of units

H. _____ Don't know

10. Which of the following input or output devices are available to students or faculty for academic computing at your institution? *(Mark EACH option):*

A. CARD READER

_____ Yes If "Yes," how many? _____
_____ No

B. PUNCHED PAPER TAPE READER OR PUNCH

_____ Yes If "Yes," how many? _____ How many of these are counted
_____ No in "C" below? __________

C. TELETYPE OR PRINTING TERMINAL

_____ Yes If "Yes," how many? _____
_____ No

D. OPTICAL CHARACTER SCANNER (ON LINE)

_____ Yes If "Yes," how many? _____
_____ No

E. LINE PRINTER

_____ Yes If "Yes," how many? _____
_____ No

F. ON-LINE CARD PUNCH

_____ Yes If "Yes," how many? _____
_____ No

10. (continued)

G. MAGNETIC TAPE DRIVE

_____ Yes   If "Yes," how many? _____

_____ No

H. VIDEO-DISPLAY (CRT) TERMINAL (simple, without graphics)

_____ Yes   If "Yes," how many? _____

_____ No

I. GRAPHIC CRT TERMINAL

_____ Yes   If "Yes," how many? _____

_____ No

J. ON-LINE PLOTTER (HARD COPY)

_____ Yes   If "Yes," how many? _____

_____ No

K. OTHER (Specify: ______________________________)

_____ How many?

11. Which of the following devices are available mainly for student use in academic computing at your institution? *(Mark EACH option):*

A. VIDEO-DISPLAY (CRT) TERMINAL (simple, without graphics)

_____ Yes   If "Yes," how many? _____

_____ No

B. GRAPHIC CRT TERMINAL

_____ Yes   If "Yes," how many? _____

_____ No

C. TELETYPE OR PRINTING TERMINAL

_____ Yes   If "Yes," how many? _____

_____ No

D. PERSONAL OR MICRO COMPUTER

_____ Yes   If "Yes," how many? _____

_____ No

12. Are any computer input or output devices which are available for academic computing located on your campus?

_____ Yes

_____ No   *If you marked "No," please go to Question 14.*

13. Are input or output devices available for academic computing located at more than one location on your campus?

_____ Yes If "Yes," how many locations? _______

_____ No

14. Which of the following card processing devices are available to students or faculty at your institution for academic computing? *(Mark EACH option):*

A. KEYPUNCH

_____ Yes If "Yes," how many? _______

_____ No

B. CARD SORTER

_____ Yes If "Yes," how many? _______

_____ No

C. INTERPRETER

_____ Yes If "Yes," how many? _______

_____ No

D. OFF-LINE OPTICAL SCANNER

_____ Yes If "Yes, how many? _______

_____ No

E. OTHER (Specify: ________________________________ How many? _______)

15. Are any card processing devices which are available for academic computing located on your campus?

_____ Yes

_____ No

16. What computer languages are available for use with the computers available to students and/or faculty for academic computing at your institution? *(Mark EACH option):*

A.	BASIC	_____	Yes	_____	No	_____	Don't know
B.	PASCAL	_____	Yes	_____	No	_____	Don't know
C.	FORTRAN	_____	Yes	_____	No	_____	Don't know
D.	PL/1	_____	Yes	_____	No	_____	Don't know
E.	COBOL	_____	Yes	_____	No	_____	Don't know
F.	APL	_____	Yes	_____	No	_____	Don't know
G.	RPG	_____	Yes	_____	No	_____	Don't know
H.	PILOT	_____	Yes	_____	No	_____	Don't know
I.	IDF	_____	Yes	_____	No	_____	Don't know
J.	COURSEWRITER	_____	Yes	_____	No	_____	Don't know
K.	ASSEMBLER	_____	Yes	_____	No	_____	Don't know

L. OTHER (Specify: ____)

17. What packaged computer programs are available to faculty or students for academic computing at your institution: *(Mark EACH option):*

A. SPSS _____ Yes _____ No _____ Don't know
B. CONVERSATIONAL SPSS _____ Yes _____ No _____ Don't know
C. SAS _____ Yes _____ No _____ Don't know
D. BMD _____ Yes _____ No _____ Don't know
E. SSP _____ Yes _____ No _____ Don't know
F. OSIRIS _____ Yes _____ No _____ Don't know
G. OTHER (Specify: ______________________________)

18. Does your institution have an academic computer center or staff?

_____ Yes _____ No *If you marked "No," go to Question 21.*

19. Which of the following types of personnel are employed in academic computing (centrally) at your institution? *(NOTE: Do NOT include students or faculty members who may serve in these roles. Mark EACH option):*

A. PROGRAMMERS

_____ Yes If "Yes," what is the total number of hours of work
_____ No per week by all programmers? ______________

B. KEYPUNCH OPERATORS

_____ Yes If "Yes," what is the total number of hours of work
_____ No per week by all keypunch operators? ______________

C. COMPUTER OPERATORS

_____ Yes If "Yes," what is the total number of hours of work
_____ No per week by all computer operators? ______________

D. SYSTEMS ANALYSTS

_____ Yes If "Yes," what is the total number of hours of work
_____ No per week by all systems analysts? ______________

E. USER SERVICES STAFF

_____ Yes If "Yes," what is the total number of hours of work
_____ No per week by all computer operators? ______________

F. ACADEMIC COMPUTING DIRECTOR

_____ Yes If "Yes," what is the total number of hours of work
_____ No per week by the Academic Computing Director?

G. OTHER (Specify: ______________________________)

20. In which of the following jobs are students or faculty employed in academic computing at your institution? *(Mark EACH option):*

A. PROGRAMMERS

1) STUDENTS

a. _____ Yes If "Yes," what is the total number of hours
b. _____ No per week for all student programmers? ______

2) FACULTY

a. _____ Yes If "Yes," what is the total number of hours
b. _____ No per week for all faculty programmers? ______

B. KEYPUNCH OPERATORS

1) STUDENTS

a. _____ Yes If "Yes," what is the total number of hours
b. _____ No per week for all student keypunchers? ______

2) FACULTY

a. _____ Yes If "Yes," what is the total number of hours
b. _____ No per week for all faculty keypunchers? ______

C. COMPUTER OPERATORS

1) STUDENTS

a. _____ Yes If "Yes," what is the total number of hours
b. _____ No per week for all student operators? ______

2) FACULTY

a. _____ Yes If "Yes," what is the total number of hours
b. _____ No per week for all faculty operators? ______

D. SYSTEMS ANALYSTS

1) STUDENTS

a. _____ Yes If "Yes, what is the total number of hours
b. _____ No per week for all student analysts? ______

2) FACULTY

a. _____ Yes If "Yes," what is the total number of hours
b. _____ No per week for all faculty analysts? ______

20. (continued)

E. USER SERVICES STAFF

1) STUDENTS

a. _____ Yes If "Yes," what is the total number of hours
b. _____ No per week for all student U.S.S.? _____

2) FACULTY

a. _____ Yes If "Yes," what is the total number of hours
b. _____ No per week for all faculty U.S.S.? _____

F. OTHER (Specify: ______________________________)

1) STUDENTS

a. _____ Yes If "Yes," what is the total number of hours
b. _____ No per week for all students in "other"? _____

2) FACULTY

a. _____ Yes If "Yes," what is the total number of hours
b. _____ No per week for all faculty in "other"? _____

21. Which of the following types of professional computer personnel are employed for academic computing purposes, OUTSIDE the central academic computing in your institution; e.g., in an academic department? *(Mark EACH option):*

A. PROGRAMMERS

_____ Yes If "Yes," what is the total number of hours worked per
_____ No week by all such programmers? ____________________

B. KEYPUNCH OPERATORS

_____ Yes If "Yes," what is the total number of hours worked per
_____ No week by all such keypunch operators? ______________

C. COMPUTER OPERATORS

_____ Yes If "Yes," what is the total number of hours worked per
_____ No week by all such computer operators? ______________

D. SYSTEMS ANALYSTS

_____ Yes If "Yes," what is the total number of hours worked per
_____ No week by all such systems analysts? ______________

21. (continued)

E. USER SERVICES STAFF

_____ Yes If "Yes," what is the total number of hours worked per
_____ No week for all such user services staff? ______________

F. OTHER (Specify: ____)

What is the total number of hours worked per week for all such "other" personnel? ______________

22. How much did your institution spend on academic computing during the 1977-78 fiscal year? *(Note definition of academic computing on page 1)*

A. HARDWARE

_____ $ 0 - $ 10,000
_____ 10,001 - 50,000
_____ 50,001 - 100,000
_____ 100,001 - 250,000
_____ 250,001 - 500,000
_____ >500,000

B. SOFTWARE

_____ $ 0 - $ 1,000
_____ 1,001 - 5,000
_____ 5,001 - 10,000
_____ 10,001 - 25,000
_____ 25,001 - 50,000
_____ >50,000

C. TELECOMMUNICATIONS

_____ $ 0 - 2,500
_____ 2,501 - 5,000
_____ 5,001 - 10,000
_____ 10,001 - 25,000
_____ 25,001 - 50,000
_____ > 50,000

D. MAINTENANCE (hardware and software)

_____ $ 0 - $ 1,000
_____ 1,001 - 2,500
_____ 2,501 - 5,000
_____ 5,001 - 10,000
_____ 10,001 - 25,000
_____ >25,000

E. PERSONNEL

_____ $ 0 - $ 10,000
_____ 10,001 - 25,000
_____ 25,001 - 50,000
_____ 50,001 - 75,000
_____ 75,001 - 100,000
_____ >100,000

F. OTHER (specify type and amount):

____

$ ______________________________

23. What is the total amount your institution has spent for all (academic and administrative) computer equipment, software, space and facilities, and other non-staff expenditures for computing, during the five fiscal years from 1973-74 through 1977-78? *(Mark the appropriate category for EACH option; AND then indicate the percentage allocated to academic computing in each category)*:

A. HARDWARE

_____ $ 0 - $ 10,000
_____ 10,001 - 50,000
_____ 50,001 - 100,000
_____ 100,001 - 250,000
_____ 250,001 - 500,000
_____ 500,001 - 1,000,000
_____ >1,000,000
_____ Don't know

Of the total spent for hardware over fiscal 1974-78, what was the approximate percentage allocated to academic computing?

_______________________%

If total expenditures for hardware exceeded $1,000,000, specify the approximate amount:

$_______________________

B. SOFTWARE

_____ $ 0 - $ 1,000
_____ 1,001 - 5,000
_____ 5,001 - 10,000
_____ 10,001 25,000
_____ 25,001 - 50,000
_____ >50,000
_____ Don't know

Of the total spent for software over fiscal 1974-78, what was the approximate percentage allocated to academic computing?

_______________________$

If total expenditures for software exceeded $50,000, specify the approximate amount:

$_______________________

C. SPACE AND FACILITIES

_____ $ 0 - $ 1,000
_____ 1,001 - 5,000
_____ 5,001 - 10,000
_____ 10,001 - 50,000
_____ 50,001 - 100,000
_____ 100,001 - 500,000
_____ >500,000
_____ Don't know

Of the total spent for space and facilities over fiscal 1974-78, what was the approximate percentage allocated to academic computing?

_______________________%

If total expenditures for space and facilities exceeded $500,000, specify the approximate amount:

$_______________________

D. OTHER (Specify type and amount:

____

$_______________________

Approximate percent spent for academic computing: _____ %

24. Which of the following are, or have been, sources of monetary support for academic computing at your institution? *(Mark EACH option):*

A. YOUR INSTITUTIONAL FUNDS

_____ Yes
_____ No
_____ Don't know

If "Yes," please indicate the total amount of institutional funds spent for academic computing in Fiscal 1977-78:

$______________

B. FEDERAL FUNDS

_____ Yes
_____ No
_____ Don't know

If "Yes," please indicate the total amount of federal funds spent for academic computing in Fiscal 1977-78:

$______________

C. STATE FUNDS

_____ Yes
_____ No
_____ Don't know

If "Yes," please indicate the total amount of state funds spent for academic computing in Fiscal 1977-78:

$______________

D. OTHER FUNDS

_____ Yes
_____ No
_____ Don't know

If "Yes," please indicate the total amount of funds other than institutional, federal or state that were spent for academic computing in Fiscal 1977-78:

$______________

25. What was the amount of academic computer use by students enrolled at your institution during the 1977-78 fiscal year? *(Mark BOTH batch and interactive options for EACH type of student):*

A. Estimated computer use by UNDERGRADUATES:

1) Number of BATCH jobs	2) Number of INTERACTIVE connect hours
___ No batch jobs	___ No interactive connect hours
___ 1 - 100	___ 1 - 100
___ 101 - 500	___ 100 - 500
___ 501 - 1,000	___ 501 - 1,000
___ 1,001 - 5,000	___ 1,001 - 5,000
___ 5,001 - 10,000	___ 5,001 - 10,000
___ 10,001 - 25,000	___ 10,001 - 25,000
___ >25,000 (How many: _______)	___ >25,000 (How many: _______)
___ Don't know	___ Don't know

B. Estimated computer use by GRADUATE STUDENTS:

1) Number of BATCH JOBS	2) Number of INTERACTIVE connect hours
___ No batch jobs	___ No interactive connect hours
___ 1 - 100	___ 1 - 100
___ 101 - 500	___ 101 - 500
___ 501 - 1,000	___ 501 - 1,000
___ 1,001 - 5,000	___ 1,001 - 5,000
___ 5,001 - 10,000	___ 5,001 - 10,000
___ 10,001 - 25,000	___ 10,001 - 25,000
___ >25,000 (How many: _______)	___ >25,000 (How many: _______)
___ Don't know	___ Don't know

In answering Question 26 below, use the following definition of "science":

CHEMISTRY (excluding health sciences)
EARTH SCIENCES
ENGINEERING
LIFE SCIENCES AND AGRICULTURE
MATHEMATICAL SCIENCE
PHYSICAL SCIENCES
PHYSICS
PSYCHOLOGY (excluding clinical)
SOCIAL SCIENCES (including economics,
excluding business and social work)

26. Of the total academic computer use by students in Fiscal 1977-78, what was the estimated percentage of use by students classified in the following ways? *(NOTE: Answers should sum to 100%):*

A. _____ % of use by students enrolled in COMPUTER SCIENCE courses
B. _____ % of use by students enrolled in OTHER SCIENCE courses
C. _____ % of use by students enrolled in ALL OTHER courses
100 %

27. What was the amount of academic computer use by faculty at your institution during the 1977-78 fiscal year? *(Mark BOTH batch and interactive options):*

A. Number of BATCH jobs	B. Number of INTERACTIVE connect hours
___ No batch jobs	___ No interactive hours
___ 1 - 100	___ 1 - 100
___ 101 - 500	___ 101 - 100
___ 1,001 - 5,000	___ 1,001 - 5,000
___ 5,001 - 10,000	___ 5,001 - 10,000
___ 10,001 - 25,000	___ 10,001 - 25,000
___ >25,000 (How many: _______)	___ >25,000 (How many: _______)
___ Don't know	___ Don't know

28. Of the total academic computer use by faculty in Fiscal 1977-78, what was the estimated percentage of use for the purpose of facilitating class administration (recording students' progress, scoring tests, storing test items, etc.)?

_______________ %

_____ Don't know

29. Of the total academic computer use by faculty in Fiscal 1977-78, what was the estimated percentage of use for the purpose of doing their own research?

_______________ %

_____ Don't know

30. In your opinion, are a majority of the faculty at your institution aware of the availability of professional computer personnel to assist them with their computing problems?

_____ Yes

_____ No

_____ Not applicable (we have no such personnel)

QUESTIONS 31-35 *seek your judgment on the status of academic computing that would be realistically desirable for your institution by the 1981-1982 academic year. In answering these questions, please consider your institution's present mission and its likely future development.*

31. In your judgment, by 1981-82, what type(s) of computing hardware should students and/or faculty at your institution be able to use for academic purposes? *(Mark only ONE of the following options):*

A. ___ Large batch (more than 500K bytes of main memory; specify: _____K)
B. ___ Medium batch (256-500K bytes of main memory)
C. ___ Small batch (less than 256K bytes of main memory)
D. ___ Interactive with more than 50 terminals (specify number: _____)
E. ___ Interactive with 33-50 terminals
F. ___ Interactive with 17-32 terminals
G. ___ Interactive with 9-16 terminals
H. ___ Interactive with 1-8 terminals
I. ___ Personal computers (at least 32 available; specify: _________)
J. ___ Personal computers (9-16 available)
K. ___ Personal computers (1-8 available)
L. ___ Other (Specify: ____)
M. ___ Some combination of the above (If so, specify: __________________
____
____)

32. In your judgment, by 1981-82 which of the following input/output devices should be available to students and/or faculty for academic computing at your institution? *(Mark EACH option):*

A. CARD READER

_____ Yes If "Yes," how many? _______

_____ No

B. PUNCHED PAPER TAPE READER OR PUNCH

_____ Yes If "Yes," how many? _______

_____ No How many of these are you also counting in "C" below? _______

32. (continued)

C. TELETYPE OR PRINTING TERMINAL

_____ Yes   If "Yes," how many? _______

_____ No

D. OPTICAL CHARACTER SCANNER (ON LINE)

_____ Yes   If "Yes," how many? _______

_____ No

E. LINE PRINTER

_____ Yes   If "Yes," how many? _______

_____ No

F. ON-LINE CARD PUNCH

_____ Yes   If "Yes," how many? _______

_____ No

G. MAGNETIC TAPE DRIVE

_____ Yes   If "Yes," how many? _______

_____ No

H. VIDEO-DISPLAY (CRT) TERMINAL (simple, without graphics)

_____ Yes   If "Yes," how many? _______

_____ No

I. GRAPHIC CRT TERMINAL

_____ Yes   If "Yes," how many? _______

_____ No

J. ON-LINE PLOTTER (HARD COPY)

_____ Yes   If "Yes," how many? _______

_____ No

K. OTHER (Specify: ____)

_____ How many?

33. In your judgment, by 1981-82 which of the following card processing devices should be available to students or faculty for academic computing at your institution? *(Mark EACH option):*

A. KEYPUNCH

_____ Yes   If "Yes," how many? _______

_____ No

B. CARD SORTER

_____ Yes   If "Yes, how many? _______

_____ No

33. (continued)

C. INTERPRETER

_____ Yes If "Yes," how many? _______

_____ No

D. OFF-LINE OPTICAL SCANNER

_____ Yes If "Yes," how many? _______

_____ No

E. OTHER (Specify, and give number: ____________________________________)

34. In your judgment, by 1981-82 what computer languages should be available to faculty or students at your institution for academic computing? *(Mark EACH option):*

A. BASIC _____ Yes _____ No _____ Don't know
B. PASCAL _____ Yes _____ No _____ Don't know
C. FORTRAN _____ Yes _____ No _____ Don't know
D. PL/1 _____ Yes _____ No _____ Don't know
E. COBOL _____ Yes _____ No _____ Don't know
F. APL _____ Yes _____ No _____ Don't know
G. RPG _____ Yes _____ No _____ Don't know
H. PILOT _____ Yes _____ No _____ Don't know
I. IDF _____ Yes _____ No _____ Don't know
J. COURSEWRITER _____ Yes _____ No _____ Don't know
K. ASSEMBLER _____ Yes _____ No _____ Don't know
L. OTHER (Specify: ____)

35. In your judgment, by 1981-82 what packaged computer programs should be available to faculty or students at your institution? *(Mark EACH option):*

A. SPSS _____ Yes _____ No _____ Don't know
B. CONVERSATIONAL SPSS _____ Yes _____ No _____ Don't know
C. SAS _____ Yes _____ No _____ Don't know
D. BMD _____ Yes _____ No _____ Don't know
E. SSP _____ Yes _____ No _____ Don't know
F. OSIRIS _____ Yes _____ No _____ Don't know
G. OTHER (Specify: ____)

QUESTIONS 36-47 *seek information on alternative arrangements for computer facilities at your institution.*

36. Does your institution currently participate in any academic computing networks?

_____ Yes *If you marked "Yes," please go to Question 38.*

_____ No

37. Has the possibility of your institution joining an academic computing network been formally investigated (e.g., through correspondence or conversation with at least one computer network representative)?

_____ Yes

_____ No

38. Does your institution currently lease a computer which is used for academic purposes?

_____ Yes *If you marked "Yes," please go to Question 40.*

_____ No

39. Has your institution formally investigated the possibility of leasing a computer to be used for academic purposes (e.g., through correspondence or conversation with at least one computing equipment representative)?

_____ Yes

_____ No

40. Does your institution currently own a computer which is used for academic purposes?

_____ Yes *If you marked "Yes," please go to Question 42.*

_____ No

41. Has your institution formally investigated the possibility of purchasing a computer to be used for academic purposes (e.g., through correspondence or conversation with at least one computing equipment representative)?

_____ Yes

_____ No

42. Does your institution currently contract with any commercial data processing companies to secure academic computing services?

_____ Yes *If you marked "Yes," please go to Question 44.*

_____ No

43. Has your institution formally investigated the possibility of contracting with a commercial data processing company to secure academic computing services (e.g., through correspondence or conversation with at least one representative of a commercial data processing company)?

_____ Yes

_____ No

44. Does your institution currently use the computer facilities of some other non-commercial institution (e.g., another higher education institution, a government agency, etc.) for academic computing purposes?

_____ **Yes** *If you marked "Yes," please go to Question 46.*

_____ **No**

45. Has your institution formally investigated the possibility of using the computing facilities of some other non-commercial institution for academic computing purposes (e.g., through correspondence or conversation with at least one representative of a non-commercial institution)?

_____ **Yes**

_____ **No**

46. Has your institution formally investigated any arrangements to secure academic computing services other than those listed in Questions 36-45?

_____ **Yes**

_____ **No** *If you marked "No," please go to Question 48.*

47. What arrangements to secure academic computing services, other than those listed in Questions 36-45, has your institution formally investigated?

____

____

____

____

48. In your opinion, to what extent, if any, are each of the following factors adversely affecting the development of academic computing at your institution? *(Circle the appropriate number according to the following scale)*

1 No problem
2 Minor problem
3 Occasional problem
4 Major problem
5 Extremely severe problem

A. 1 2 3 4 5 **BUDGET LIMITATIONS**

B. 1 2 3 4 5 **LACK OF PROFESSIONAL COMPUTER PERSONNEL**

C. 1 2 3 4 5 **LEVEL OF EXPERTISE OF AVAILABLE PERSONNEL**

D. 1 2 3 4 5 **LEVEL OF EXPERTISE AMONG POTENTIAL COMPUTER USERS**

E. 1 2 3 4 5 **INSTITUTIONAL BUDGET PRIORITIES**

F. 1 2 3 4 5 **SPACE OR FACILITIES LIMITATIONS**

G. 1 2 3 4 5 **LACK OF COMPUTER HARDWARE**

H. 1 2 3 4 5 **LACK OF COMPUTER SOFTWARE OR APPROPRIATE COURSEWARE**

I. 1 2 3 4 5 **LACK OF INTEREST IN ACADEMIC COMPUTING BY ADMINISTRATION**

J. 1 2 3 4 5 **LACK OF INTEREST IN ACADEMIC COMPUTING BY FACULTY**

K. 1 2 3 4 5 **OTHER (Specify: ______________________________)**

Please check to make sure you have answered all of the questions. Please place the completed questionnaire in the self-addressed, stamped envelope provided, and mail it immediately.

THANK YOU FOR YOUR COOPERATION!

NEEDS SURVEY

ON EDUCATIONAL COMPUTING IN MINORITY INSTITUTIONS

DEAN OR ACADEMIC VICE PRESIDENT

Please print or type NAME ______________________________

TELEPHONE ____________ TITLE ______________________________
Area code/No.

INSTITUTION ______________________________

Current information:

1. What percentage of the currently enrolled students in your institution are members of each of the following racial or ethnic groups? *(Spring, 1979)*

A. _____% Black
B. _____% Hispanic
C. _____% American Indian
D. _____% Eskimo
E. _____% Asian
F. _____% Alaskan Indian
G. _____% Other (specify: ______________)
H. _____% TOTAL *(should equal 100%)*

2. How many teaching faculty members does your institution currently employ? *(Current spring semester)*

A. _____ Full time only
B. _____ Full-time equivalent *(Example: If 2 faculty members each work half time, the full-time equivalent would be 1. This number should include both full-time and part-time teaching faculty.)*

QUESTIONS 3-6 *request information about the science program at your institution.* ***Use the definition of science given below:***

Chemistry (excluding health sciences)
Earth sciences
Engineering
Life sciences and agriculture
Mathematical and computer sciences
Physical sciences
Physics
Psychology (excluding clinical)
Social sciences (including economics, excluding business and social work)

3. Does your institution offer any science courses *(as defined on page 1)*?

____ Yes
____ No *If the answer to Question 3 is "No," please go to Question 7.*

4. This question seeks information on the size of your science program *(current spring semester, unless otherwise specified)*:

A.
____ 0- 50
____ 51- 100
____ 101- 250
____ 251- 500
____ 501-1,000
____ >1,000

How many currently enrolled students are science majors at your institution *(science defined as on page 1)*?

Check one answer at left.

B.
____ 1- 50
____ 51- 100
____ 101- 250
____ 251- 500
____ 501-1,000
____ >1,000

What is the current total enrollment in science classes at your institution *(science defined as on page 1)*?

Check one answer at left.

C.
____ 0-10
____ 11-20
____ 21-50
____ >50

How many full-time faculty members have taught, are teaching, or will teach science courses at your institution during the 1978-79 academic year *(do not include a summer session)*?

D.
____ 0-10
____ 11-20
____ 21-50
____ >50

What is the number of full-time equivalent (FTE) faculty who have taught, are teaching, or will teach science courses during the 1978-79 academic year at your institution?

E.
____ 0- 5
____ 6-10
____ 11-20
____ 21-30
____ >30

What is the number of different science courses offered at your institution during the 1978-79 academic year? *(NOTE: Do not count more than one offering of the same course.)*

F. How many students have graduated from your institution during the five academic years 1973-74 through 1978-79, with degrees or majors in a science field?

ASSOCIATE	BACHELOR	MASTER	DOCTORATE
____ 0- 50	____ 0- 50	____ 0- 10	____ 0- 10
____ 51- 100	____ 51- 100	____ 11- 25	____ 11- 25
____ 101- 250	____ 101- 250	____ 26- 50	____ 26- 50
____ 251- 500	____ 251- 500	____ 51-100	____ 51-100
____ 501-1,000	____ 501-1,000	____ >100	____ >100
____ >1,000	____ >1,000		

NUMBER OF OTHER SCIENCE DEGREES OR CERTIFICATES (SPECIFY: ________________
____
____

____ 0- 50
____ 51- 100
____ 101- 250
____ 251- 500
____ 501-1,000
____ >1,000

5. Are the following degrees in science *(as defined on page 1)* offered?

A. ___Yes ___No Associate

B. ___Yes ___No Bachelor

C. ___Yes ___No Master

D. ___Yes ___No Doctorate

6. Is a minor in science offered?

A. ___Yes ___No

7. Does your institution have access to a computer?

___ Yes

___ No *If the answer to Question 7 is "No," please go to Question 10.*

8. Is the computer located on campus?

___ Yes

___ No

___ Don't know

9. Is there a separate budget for academic computing at your institution *(separate from administrative computing)*:

___ Yes

___ No

___ Don't know

QUESTIONS 10-18 *seek your judgments on the status of academic computing that would be realistically desirable for your institution by the 1981-82 academic year. In answering these questions, please consider your institution's present mission and its likely future development. (RESPONSES TO EACH OF THESE QUESTIONS SHOULD TOTAL 100%.)*

10. In your judgment, by 1981-82 what percentage of students enrolled at your institution should have computing skills at each of the following levels in order to perform successfully AS STUDENTS?

A. _____ % No computer training or skills

B. _____ % General awareness of computers (a single course about the role of computers in society, but little or no personal use of a computer)

C. _____ % Limited personal computer use and skill (use of others' computer programs and instructional materials on a computer, but no computer programming skills)

D. _____ % Ability to program a computer and programming experience (at least one course in computer programming or equivalent personal experience)

100 %

11. In your judgment, by 1981-82 what percentage of students enrolled at your institution should have computing skills at each of the following levels in order to perform successfully IN LIFE after they graduate?

A. _____ % No computer training or skills

B. _____ % General awareness of computers (a single course about the role of computers in society, but little or no personal use of a computer)

C. _____ % Limited personal computer use and skill (use of others' computer programs and instructional materials on a computer, but no computer programming skills)

D. _____ % Ability to program a computer and programming experience (at least one course in computer programming or equivalent personal experience)

100%

12. In your judgment, by 1981-82 what percentage of students enrolled at your institution should have access to computers at each of the following levels, in order to complete their classwork and homework assignments?

A. _____ % No access to computers for classwork or homework

B. _____ % Limited access to computers for classwork or homework (in one or two classes per academic year)

C. _____ % Moderate access to computers for classwork or homework (in 3-5 classes per academic year)

D. _____ % Unlimited access to computers for classwork or homework

100%

13. In your judgment, by 1981-82 what percentage of students enrolled at your institution should use computers in conjunction with their independent research at each of the following levels?

A. _____ % No computer use for independent research

B. _____ % Limited computer use for independent research (less than two weeks of computer work for this purpose per academic year)

C. _____ % Moderate computer use for independent research (2-8 weeks of computer work for this purpose per academic year)

D. _____ % Substantial computer use for independent research (more than 8 weeks of computer use for this purpose per academic year)

100%

14. In your judgment, by 1981-82 what percentage of your teaching faculty should have access to computers at each of the following levels, for administrative use in their classes (e.g., recording students' progress, scoring tests, storing test items, etc.)?

A. _____ % No access to computers for administrative use in classes

B. _____ % Limited access to computers for administrative use in classes (in one or two classes per academic year)

C. _____ % Moderate access to computers for administrative use in classes (in three or four classes per academic year)

D. _____ % Unlimited access to computers for administrative use in classes

100%

15. In your judgment, by 1981-82 what percentage of your teaching faculty should have access to computers at each of the following levels for instructional use in their classes (e.g., demonstrating solutions to problems, conducting simulations, etc.)?

A. _____ % No access to computers for instructional use in classes

B. _____ % Limited access to computers for instructional use in classes (in one or two classes per academic year)

C. _____ % Moderate access to computers for instructional use in classes (in three or four classes per academic year)

D. _____ % Unlimited access to computers for instructional use in classes

100 %

16. In your judgment, by 1981-82 what percentage of your teaching faculty should use computers in conjunction with their independent research at each of the following levels?

A. _____ % No computer use for independent research

B. _____ % Limited computer use for independent research (at most, in one research study per academic year)

C. _____ % Moderate computer use for independent research (in more than one but less than three research studies per academic year)

D. _____ % Substantial computer use for independent research (in more than three research studies per academic year)

100 %

17. In your judgment, by 1981-82 should students at your institution have access to computers for unscheduled activities such as experimentation and games?

A. _____ Yes

B. _____ No

18. In your judgment, by 1981-82 should teaching faculty at your institution have access to computers for unscheduled activities such as experimentation and games?

A. _____ Yes

B. _____ No

QUESTIONS 19-22 *seek your judgments on the academic orientation of your institution.*

19. Which of the following statements best describes your institution? *(Mark one answer)*

A. _____ Arts are emphasized more than sciences.

B. _____ Sciences are emphasized more than arts.

C. _____ Arts and sciences are emphasized equally.

20. Which of the following statements best describes your institution? *(Mark one answer)*

A. _____ Undergraduate education is emphasized more than graduate education.
B. _____ Graduate education is emphasized more than undergraduate education.
C. _____ Undergraduate and graduate education are emphasized equally.

21. Rate each of the following educational activities in terms of importance at your institution *(Mark one answer for each activity)*:

A. CAREER TRAINING OF UNDERGRADUATES

_____ Most important activity at our institution
_____ Very important activity
_____ Moderately important activity
_____ Unimportant activity
_____ Does not exist at our institution

B. LIBERAL ARTS EDUCATION OF UNDERGRADUATES

_____ Most important activity at our institution
_____ Very important activity
_____ Moderately important activity
_____ Unimportant activity
_____ Does not exist at our institution

C. PROFESSIONAL EDUCATION OF GRADUATE STUDENTS (e.g., teaching, law, medicine, etc.)

_____ Most important activity at our institution
_____ Very important activity
_____ Moderately important activity
_____ Unimportant activity
_____ Does not exist at our institution

D. LIBERAL ARTS EDUCATION OF GRADUATE STUDENTS

_____ Most important activity at our institution
_____ Very important activity
_____ Moderately important activity
_____ Unimportant activity
_____ Does not exist at our institution

E. ADULT EDUCATION

_____ Most important activity at our institution
_____ Very important activity
_____ Moderately important activity
_____ Unimportant activity
_____ Does not exist at our institution

F. OTHER (Specify: ____)

_____ Most important activity at our institution
_____ Very important activity
_____ Moderately important activity
_____ Unimportant activity

22. When a faculty member is considered for promotion at your institution, which of the following statements best describes consideration of his/her performance?

A. _____ Teaching performance is given greatest consideration.
B. _____ Published research is given greatest consideration.
C. _____ Teaching and published research are considered equally.
D. _____ Other (specify: ______________________________)

FOR QUESTIONS 23-30 *please place a check over the response that best reflects your opinion of each statement (mark ONE response for EACH statement).*

23. Many students would (or do) benefit from a computer science program at this institution.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

24. A computer science curriculum at this institution would (or does) attract many good students.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

25. Computer-assisted instruction has little value in higher education.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

26. The quality of faculty research at this institution is (or would be) enhanced by the use of computers.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

27. In allocating institutional funds, instructional computing should be given low priority.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

28. A science program is essential at this institution.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

29. All bachelor's degree students at this institution should take at least one science course.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

30. Science is not important for undergraduates in career training programs at this institution.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

QUESTIONS 31 AND 32 *seek information on computing activities at your institution.*

31. Have campus-wide study groups met to study the acquisition or improvement of computer facilities and capabilities for instructional purposes?

_____ Yes

_____ No

32. Have persons from your institution attended any of the following conferences during the past five years for the purpose of updating or better informing themselves on instructional computing? *(Mark EACH option):*

A. ECMI (Educational Computing in Minority Institutions)

___ Yes ___ No ___ Don't know

B. CCUC (Conference on Computers in Undergraduate Curricula)

___ Yes ___ No ___ Don't know

C. AEDS (Association for Educational Data Systems)

___ Yes ___ No ___ Don't know

D. NAUCAL (National Association of Users of Computers Applied to Learning)

___ Yes ___ No ___ Don't know

E. ADCIS (Association for Development of Computer-based Instructional Systems)

___ Yes ___ No ___ Don't know

F. OTHER (Specify: ____)

Please check to make sure that you have answered all the questions that pertain to your institution. Thank you for your cooperation.

Please place the completed questionnaire in the self-addressed, stamped envelope provided and mail it immediately.

NEEDS SURVEY

ON EDUCATIONAL COMPUTING IN MINORITY INSTITUTIONS

SCIENCE DEPARTMENT HEAD

Please print or type NAME ______________________________

TELEPHONE: TITLE ______________________________

______________________ DEPARTMENT ______________________________

Area code and number

INSTITUTION ______________________________

QUESTIONS 1-20 *seek information on the current status, use and quality of academic computing in your department.*

> *NOTE: Academic computing includes only computer work in support of the academic program of the institution, such as instruction, research, etc. It* *does not* *include registration, course scheduling, etc., for the institution.*

1. Do the faculty and/or students in your department have, or have access to, a computer for academic purposes?

_____ Yes

_____ No *If you marked "No," please go to Question 10.*

2. Does your institution make computer facilities accessible to your students?

Undergraduates: ___ Yes ___ No

Graduate students: ___ Yes ___ No

If your answer to Question 2 is "No" for both undergraduates and graduates, please go to Question 4.

3. What percentage of students currently enrolled in courses offered by your department use computers for the following activities? *(NOTE: Percentages might NOT sum to 100%.)*

A. _____ % Learning about computers and computer programming

B. _____ % Computer-assisted instruction (to learn subject matter)

C. _____ % Problem solving in their courses

D. _____ % As a tool in their research

E. _____ % Games or experimentation (excluding coursework)

F. _____ % Other (Specify: ______________________________)

4. Does your institution make computer facilities accessible to the teaching faculty in your department?

_____ Yes

_____ No *If you answered "No" to Question 4, please go to Question 6.*

5. What percentage of faculty members in your department use computers for the following activities? *(NOTE: Percentages might NOT sum to 100%.)*

A. _____ % Facilitating administration of classes (e.g., recording student progress, scoring tests, storing test items, etc.)

B. _____ % Facilitating instruction in classes (e.g., demonstrating solutions to problems, conducting simulations, etc.)

C. _____ % As a tool in their research

D. _____ % Games or experimentation

E. _____ % Other (Specify: ____)

6. In your opinion, what percentage of NEW students entering your department in the fall of 1978 had computing skills at each of the following levels at the time they entered? *(Mark EACH option. Percentages should sum to 100%.)*

A. _____ % No computer training, knowledge, or skills

B. _____ % General awareness of computers (knowledge about computers and computing in society, but little or no direct use of computers)

C. _____ % Limited personal computer use and skill (use of others' computer programs and instructional materials on a computer, but no programming skill)

D. _____ % Ability to program a computer and programming experience in at least one language

100 %

7. What percentage of the students currently enrolled in your department have computing skills at each of the following levels in your opinion? *(Mark EACH option. Percentages should sum to 100%.)*

A. _____ % No computer training, knowledge, or skills

B. _____ % General awareness of computers (knowledge about computers and computing in society, but little or no direct use of computers)

C. _____ % Limited personal computer use and skill (use of others' computer programs and instructional materials on a computer, but no programming skill)

D. _____ % Ability to program a computer (at least one course in programming, or equivalent instruction or experience)

8. In your opinion, what percentage of faculty in your department have computing skills at each of the following levels? *(Mark EACH option. Percentages should sum to 100%.)*

A. _____ % No computer training, knowledge, or skills

B. _____ % General awareness of computers (knowledge about computers and computing in society, but little or no direct use of computers)

C. _____ % Limited personal computer use and skill (use of others' computer programs and instructional materials on a computer, but no programming skill)

D. _____ % Ability to program a computer and programming experience in at least one language

QUESTIONS 9-17 *seek your judgments on the status of academic computing that would be realistically desirable for your department by the 1981-1982 academic year. In answering these questions, please consider your department's present mission and its likely future development. (NOTE: Responses to each of Questions 9-17 should total 100%.)*

9. In your judgment, by 1981-1982 what percentage of students enrolled in courses offered by your department should have computing skills at each of the following levels in order to perform successfully AS STUDENTS?

A. _____ % No computer training or skills

B. _____ % General awareness of computers (a single course about the role of computers in society or your discipline, but little or no personal use of a computer)

C. _____ % Limited personal computer use and skill (use of others' computer programs and instructional materials on a computer, but no computer programming skills)

D. _____ % Ability to program a computer and programming experience (at least one course in computer programming or equivalent personal experience)

100 %

10. In your judgment, by 1981-1982 what percentage of students enrolled in courses offered by your department should have computing skills at each of the following levels in order to perform successfully AS PROFESSIONALS AFTER GRADUATION?

A. _____ % No computer training or skills

B. _____ % General awareness of computers (a single course about the role of computers in society or your discipline, but little or no personal use of a computer)

C. _____ % Limited personal computer use and skill (use of others' computer programs and instructional materials on a computer, but no computer programming skills)

D. _____ % Ability to program a computer and programming experience (at least one course in computer programming or equivalent personal experience)

100 %

11. In your judgment, by 1981-1982 what percentage of students enrolled in courses offered by your department should have access to computers at each of the following levels, in order to complete their classwork and homework assignments?

A. _____ % No access to computers for classwork or homework

B. _____ % Limited access to computers for classwork or homework (in one or two classes per academic year)

C. _____ % Moderate access to computers for classwork or homework (in 3-5 classes per academic year)

D. _____ % Unlimited access to computers for classwork or homework

100 %

12. In your judgment, by 1981-1982 what percentage of students enrolled in courses offered by your department should use computers in conjunction with their independent research at each of the following levels?

A. _____ % No computer use for independent research

B. _____ % Limited computer use for independent research (less than 2 weeks of computer work for this purpose per academic year)

C. _____ % Moderate computer use for independent research (2-8 weeks of computer work for this purpose per academic year)

D. _____ % Substantial computer use for independent research (more than 8 weeks of computer use for this purpose per academic year)

100 %

13. In your judgment, by 1981-1982 what percentage of faculty in your department should have access to computers at each of the following levels for administrative use in their classes (e.g., recording students' progress, scoring tests, storing test items, etc.)?

A. _____ % No access to computers for administrative use in classes

B. _____ % Limited access to computers for administrative use in classes (in one or two classes per academic year)

C. _____ % Moderate access to computers for administrative use in classes (in 3-4 classes per academic year)

D. _____ % Unlimited access to computers for administrative use in classes

100 %

14. In your judgment, by 1981-1982 what percentage of faculty in your department should have access to computers at each of the following levels, for instructional use in their classes (e.g., demonstrating solutions to problems, conducting simulations, etc.)?

A. _____ % No access to computers for instructional use in classes

B. _____ % Limited access to computers for instructional use in classes (in one or two classes per academic year)

C. _____ % Moderate access to computers for instructional use in classes (in 3-4 classes per academic year)

D. _____ % Unlimited access to computers for instructional use in classes

100 %

15. In your judgment, by 1981-1982 what percentage of faculty in your department should use computers in conjunction with their independent research at each of the following levels?

A. _____ % No computer use for independent research

B. _____ % Limited computer use for independent research (at most, in one research study per academic year)

C. _____ % Moderate computer use for independent research (in more than one but less than three research studies per academic year)

D. _____ % Substantial computer use for independent research (in more than three research studies per academic year)

100 %

16. In your judgment, by 1981-1982 should students enrolled in courses offered by your department have access to computers for unscheduled activities such as experimentation and games?

_____ Yes _____ No

17. In your judgment, by 1981-1982 should faculty in your department have access to computers for unscheduled activities such as experimentation and games?

_____ Yes _____ No

ON QUESTIONS 18-20 *please place a check over the response that best reflects your opinion on each statement. (Mark ONE response for EACH statement):*

18. Computer-assisted instruction has little value in this department's discipline at the higher-education level.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

19. The quality of faculty research in my department is enhanced by the use of computers.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

20. In allocating departmental funds, computing should be given low priority.

Strongly agree	*Agree*	*Disagree*	*Strongly disagree*	*No opinion*

21. Have study groups from your department met to plan for the acquisition or improvement of computer facilities and capabilities?

_____ Yes _____ No _____ Don't know

Please check to make sure that you have answered all the questions that pertain to your department and return this questionnaire in the enclosed, self-addressed envelope. Thank you for your coopertion.

Mail the completed questionnaire immediately.

APPENDIX E

ECMI CONFERENCE EVALUATION

THE IMPACT OF CONFERENCES ON EDUCATIONAL COMPUTING FOR MINORITY COLLEGES AND UNIVERSITIES

THOMAS J. MCALPINE
DIRECTOR OF INSTITUTIONAL RESEARCH
ALABAMA A. & M. UNIVERSITY
NORMAL, AL 35762

AND

DONALD L. ALDERMAN
EDUCATIONAL TESTING SERVICE
PRINCETON, NJ 08540

APPENDIX E

The Impact of Conferences on Educational Computing for Minority Colleges and Universities

Thomas J. McAlpine
Alabama A&M University
Normal, Alabama 35762

and

Donald L. Alderman
Educational Testing Service
Princeton, New Jersey 08541

June 1980

This report is based upon work supported by the National Science Foundation under Grant Number SPI-78-21515, Sister Patricia Marshall, Xavier University of Louisiana, Principal Investigator. Any opinions, findings, and conclusions are those of the authors and do not necessarily reflect the views of the National Science Foundation.

Contents

Summary iii

Introduction 1

Purpose 2

Procedures 3

Results and Discussion 4

    ECMI/3 Follow-up Questionnaire 4

    Questionnaire on ECMI Conferences 8

Conclusions 16

Appendix 18

Summary

Participants in a series of three conferences on educational computing for minority colleges and universities were surveyed about their reactions to the conferences and their subsequent activities related to computers. The conferences had been held in order to acquaint faculty members from minority institutions with computer applications in teaching and learning. Then the faculty could return to their campuses and begin developing or adapting computer materials for their own courses, thus providing exposure to computers for students at minority colleges and universities. The major findings from follow-up questionnaires distributed to conference participants were:

- Nearly fourty-five percent of the respondents to a follow-up questionnaire about the third conference cited it as the only help given to them for initiating or developing academic computing at their campuses.
- From seventy-five to ninety percent of respondents to a follow-up questionnaire on all three conferences believed their participation in the conferences was "very worthwhile" or "worthwhile".
- Forty percent of the respondents reported using computers in their courses to illustrate concepts.
- Ninety percent of the respondents had engaged in further activities, primarily independent study to increase their knowledge of computers.
- Respondents indicated that there were needs at their institutions for further faculty development with respect to computing, for faculty release time to work on computer applications, and for more terminals.

Introduction

From 1975 to 1977 a series of three conferences on educational computing was held for faculty from minority colleges and universities. These conferences were intended to acquaint faculty from minority institutions with computer applications for teaching and learning and to provide them with essential skills for developing computer applications at their own campuses. Each conference lasted four days and included sessions focusing on particular programming languages and on computer applications within specific disciplines. The participants represented two-year community colleges, four-year colleges and universities whose student enrollment was predominantly American Indian, Black, or Hispanic.

The overall goal of these conferences was to promote the development and dissemination of educational computing at minority institutions of higher education. It was felt that experience learning and working with computers would benefit all students and that students at minority institutions, in particular, had little exposure to computers in their courses. Faculty familiar with computer uses in higher education and capable of developing or adapting computer curricular materials could provide students with an opportunity for such exposure. Under these assumptions a steering committee, composed primarily of directors of computer centers and other advocates of computer uses and drawn principally from minority institutions, organized and offered three conferences on Educational Computing for Minority Institutions (ECMI/1, ECMI/2, and ECMI/3).

Nearly one-thousand faculty members from minority institutions attended these conferences. Of 245 applicants there were 197 participants in ECMI/1 in 1975. The next year's conference, ECMI/2 in 1976, attracted 607 applicants and accomodated 345 participants. And 735 faculty members applied and 379 participants attended the third conference, ECMI/3 in 1977, which also hosted 56 presidents of minority colleges and universities. Clearly these conferences had become popular and attracted larger audiences each year. The presidents at ECMI/3 alone represented approximately one-fourth of all minority colleges and universities in the United States and its territories. But what did the conferences actually accomplish and how did participants react to their experience at the ECMI conferences?

Purpose

This report is part of a broader assessment of the needs of minority colleges and universities with respect to educational computing, and it focuses on the perceptions and activities of participants in the ECMI conferences. Faculty members rated the overall impact of the ECMI conferences as well as the usefulness of specific kinds of sessions held at the conferences; they also reported on their activities related to educational computing since attending an ECMI conference. These ratings could provide constructive guidance for subsequent efforts in developing greater faculty familiarity and expertise in educational computing. And participants' perceptions of problems and obstacles at their institutions might suggest needs as viewed from the perspective of those individuals closest to both the present status and the future potential of computing at minority colleges and universities. Finally, the computer-related classroom activities of participants in the ECMI conferences perhaps constitutes the most important evidence of the conferences' success in fostering computer applications at minority institutions.

Procedures

Two brief questionnaires were sent to participants in the ECMI conferences. One questionnaire was sent to the 379 faculty members who had attended ECMI/3 nine months after the conference; (January 1978); another questionnaire was sent to roughly one-third of the participants in the three conferences, 362 faculty members of the 921 total attendance, several years after the actual conferences (December 1979). Although there had been similar questionnaires completed by participants immediately before and after the conferences, the two questionnaires considered here differ from the others in that faculty had returned to their campuses and could actively pursue computer applications in their courses.

The questionnaires called for participants' reactions to the conference, for their judgments of the conference's impact and benefit, for a report on their activities since the conference, and for an assessment of their institution's [illegible] problems with respect to computing (see Appendix for copies of the instruments). Questions about the conference itself dealt with the helpfulness of different session formats and the worthwhileness of the conference as a whole. Items on the conference's impact and benefit covered skills acquired by participants at the conference and perceptions of the conference's influence on participants' subsequent activities. Other questions specifically addressed the nature of those subsequent activities: different classroom uses of computers and the preparation of proposals related to computer applications, and various modes of independent study on topics in computing. Finally, there were questions on institutional needs, plans, and problems in educational computing.

Responses to these questionnaires appear below in descriptive summaries. The format of the questionnaires does not lend itself to the construction of scales and the response rates would not justify inferential statistical tests. Rather the most direct evidence on the success of the ECMI conferences and on the needs of minority colleges and universities with respect to educational computing, insofar as available through these questionnaires, probably arises from a straightforward presentation of participants' responses, reactions, and comments. It should also be noted that the summaries included here reflect the opinions and judgments of a fairly select group of faculty members at minority institutions (i.e., those interested enough in computing to attend an ECMI conference and to complete and return a questionnaire distributed at least two-and-one-half years after the conference) and that any firm conclusions from these data would be premature.

Results and Discussion

ECMI/3 Follow-up Questionnaire. There were 206 responses to the ECMI/3 questionnaire distributed to 379 participants nine months after the conference. This response rate (54%) is generally consistent with the rates found in other mail surveys without subsequent reminders to complete and return the questionnaire. The majority of the respondents (106) had attended conference sessions on the BASIC programming language while over one-third (73) of the respondents had participated in sessions on the FORTRAN programming language and less than one-tenth (15) in sessions on PL/1. These sessions had been intended to acquaint faculty members with the basic elements of a particular programming language. Respondents had also participated in thirteen separate sessions oriented toward computer uses in specific academic disciplines: mathematics (41), biology (23), education (21), sociology (19), chemistry (16), history (15), management science (14), English (13), psychology (11), physics (9), political science (7), languages (7), and economics (5).

This survey conducted nine months after the ECMI/3 conference permits contrasts with responses to questionnaires distributed immediately before and after the conference. Table 1 presents such contrasts for three key questions common in the questionnaires. With regard to respondents' overall judgment of the benefit of their participation in the conference, few faculty members considered the conference to be a "waste of time" but neither did the conference meet their expectations.

While over forty percent (43.3%) of the participants expected the conference to be "very worthwhile", approximately twenty-five percent of the participants (27.4% just after the conference and 28.2% on the follow-up questionnaire) found it to have actually been "very worthwhile". Similarily, just ten percent (10.2%) of the participants expected the conference to be "fairly worthwhile" or "somewhat worthwhile" but over twenty-five percent (31.1% just after the conference and 26.7% on the follow-up questionnaire) used these response categories to describe the benefit of their participation after the conference. Participants' judgments of the

Table 1

ECMI/3 Questionnaire Responses across Time Periods

	Prior to Conference		After Conference		Follow-up to Conference	
Question and Response	N	Percent	N	Percent	N	Percent
Benefit of participation in conference:						
Very Worthwhile	157	43.3	90	27.4	58	28.2
Worthwhile	163	44.9	132	40.2	88	42.7
Fairly Worthwhile	25	6.9	55	16.8	30	14.6
Somewhat Worthwhile	12	3.3	47	14.3	25	12.1
Waste of Time	5	1.4	4	1.2	4	1.9
Most helpful conference activity:						
Discipline Group Sessions	90	27.1	144	43.9	76	39.0
Language Sessions	79	23.8	133	40.5	46	23.6
General Sessions	4	1.2	14	4.3	19	9.7
All Sessions	157	47.3	67	20.4	56	28.7
Expectations and actual experiences with respect to academic computing:						
Course use to illustrate concepts	49	13.5	170	63.4	42	20.4
Course use to score and analyze test results	27	7.4	27	10.1	25	12.1
Mention computers in course coverage	149	41.0	71	26.5	153	74.3
No course use or coverage of computers	138	38.0	0	0	11	5.3
Wrote or assisted in computer-related proposal					52	25.2

helpfulness of various session formats offered at the conference and their actual classroom activities related to computers perhaps explain this decline from initial expectations of the benefit of participation in the conference.

From participants' choices of the most helpful session formats it is clear that they expected sessions to be helpful, favored the discipline group sessions and programming language sessions immediately after the conference, and indicated a preference for the discipline group sessions nine months later (see Table 1). Consistent with this pattern of responses on the helpfulness of various sessions formats were participants' expectations and experiences regarding classroom uses of the computer. After the conference there were sixty percent (63.4%) of the participants who expected to use the computer to illustrate concepts in their courses but just twenty percent (20.4%) reported attaining that goal nine months later. And whereas one-fourth (26.5%) of the participants anticipated mentioning computers in their courses after the conference, nearly three-fourths (74.3%) of the participants actually did so. It would seem that the glow of confidence in developing and implementing computer applications faded back on campus and participants instead integrated computers into their courses through lecture and discussion. Either the sessions on specific programming languages provided an inadequate basis for further independent work or, more probably, the participants underestimated the obstacles to educational computing on their campuses (e.g., inadequate computer facilities, lack of support staff, difficulties inherent to the development of computer-based curricular materials).

Table 2 gives a summary of responses to other items on the questionnaire. That almost seventy percent (69.4%) of the respondents described the benefit of participation in the conference by choosing "acquainted me with the computer and its uses in my discipline" perhaps best reflects the impact and the original intent of the conference. Most respondents (69.4%) did pursue further independent study of computing, primarily through additional reading. Seventy percent (69.9%) of the respondents had also worked actively to initiate or further develop academic computing at their institutions (see question nine on ECMI/3 questionnaire in appendix). And despite the modest impact of the conference, it represented the only help in academic computing given to forty-five percent (44.7%) of the respondents and the most important influence on another fifteen percent (14.6%). Given the important role of the conference in providing assistance to faculty from minority institutions it is understandable that two-thirds of the respondents believed their institution would "greatly" (40.8%) or "much" (25.7%) benefit from another ECMI conference.

Questionnaire on ECMI Conferences. A random sample of the 921 participants in the three ECMI conferences received a follow-up questionnaire in December 1979. Of 362 questionnaires sent to participants there were 176 responses for an overall response rate of 48.6%. These responses represented participants from the three conferences fairly equally, with 53 respondents from ECMI/1 (30.1%), 61 from ECMI/2 (34.7%), and 58 from ECMI/3 (33.0%). The number of respondents who had attended group sessions in particular disciplines and on certain programming languages can be found in subsequent tables.

Table 2

ECMI/3 Questionnaire Responses on Selected Items

ECMI/3 Questionnaire Responses		
Question and Response	N	Percent
Specific benefits of participation in conference:		
Acquainted me with the computer and its uses in my dicipline	143	69.4
Enabled me to use the computer in my courses	45	21.8
Enabled me to mention computers in my courses	59	28.6
Enabled me to do a better job writing or assisting in a computer-related proposal	35	17.0
Sufficient learning at conference to continue independent study of computing:		
Yes	143	69.4
Took one or more courses in computing after ECMI	9	4.4
Tried to learn more on my own	97	47.1
Attended additional workshop or seminar	17	8.3
Did additional reading	98	47.6
Extent of conference's influence on initiating or further developing academic computing at participant's campus:		
Conference represented the only help given to me	92	44.7
Conference represented the most important influence among others	30	14.6
Conference was an influence but less important than others	28	13.6
Conference did not help	29	14.1
Extent of probable benefit to your institution of another ECMI conference:		
Greatly	84	40.8
Much	53	25.7
Some	46	22.3
A little	6	2.9
None	11	5.3

Respondents' overall perceptions of the worthwhileness of the conferences appear in Table 3. Each successive conference received more favorable ratings as seventy-five percent of the respondents from ECMI/1 viewed that conference as "very worthwhile" (41.5%) or "worthwhile" (34.0%), eighty-four percent of the respondents from ECMI/2 (44.3% and 39.3%) and ninety percent of the respondents from ECMI/3 (44.9% and 45.1%) gave these same responses. These ratings represent an improvement from those given in the follow-up questionnaire for ECMI/3 alone (see Table 1). Yet the two surveys, the follow-up questionnaire for ECMI/3 alone and the follow-up questionnaire for all three conferences, had comparable response rates so differences in the participants represented by respondents seem a weak explanation for this improvement. It may instead be that the longer the elapsed time from the original conference, the greater the opportunity for participants to pursue computer applications in their courses and thus realize a benefit from participation in ECMI conferences.

The extent to which participants reported computer uses in their academic work is shown in Table 4. Nearly forty percent (39.8%) of respondents reported using computers in their courses to illustrate concepts and another twenty-three percent (22.7%) reported mentioning computers in their courses in connection with some material. Only eleven respondents reported never using or mentioning computers in their academic work. The level of participants' use of computers for illustrating course concepts was apparently highest in those disciplines most amenable to such applications: mathematics, chemistry, management science (e.g., data processing

Table 3

Participants' Ratings of ECMI Conferences

	Ratings									
	Very Worthwhile		Worthwhile		Fairly Worthwhile		Somewhat Worthwhile		Waste of Time	
Conference	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
ECMI/1	22	41.5	18	34.0	8	15.1	5	9.4	0	0
ECMI/2	27	44.3	24	39.3	4	6.6	6	9.8	0	0
ECMI/3	28	48.3	24	41.4	4	6.9	2	3.4	0	0
Total	79	44.9	67	38.1	17	9.7	13	7.4	0	0

Table 4

Participants' Uses of Computers in their Academic Work

					Course Use							
	Total		Illustrate Concepts		Analyze & Score Tests		Mention Computers		Research Projects		Never Mention or Use Computers	
Discipline Group	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
Mathematics	44	25.0	29	65.9	4	9.1	4	9.1	2	4.5	2	4.5
Biology	18	10.2	5	27.8	1	5.6	6	33.3	2	11.1	3	16.7
Sociology	17	9.7	6	35.3	2	11.8	2	11.8	3	17.6	2	11.8
Chemistry	16	9.1	8	50.0	2	12.5	2	12.5	2	12.5	1	6.3
History	16	9.1	3	18.8	3	18.8	8	50.0	1	6.3	1	6.3
Management Science	14	8.0	7	50.0	1	7.1	3	21.4	1	7.1	0	0
Physics	9	5.1	4	44.4	2	22.2	2	22.2	0	0	0	0
Political Science	9	5.1	3	33.3	0	0	3	33.3	1	11.1	1	11.1
Economics	8	4.5	2	25.0	0	0	2	25.0	4	50.0	0	0
Psychology	8	4.5	0	0	1	12.5	2	25.0	4	50.0	0	0
Education	7	4.0	2	28.6	1	14.3	3	42.9	0	0	0	0
Other	10	5.7	1	10.0	0	0	3	30.0	1	10.0	1	10.0
Total	176	100.0	70	39.8	17	9.7	40	22.7	21	11.9	11	6.3

within business administration), and physics. It could be argued that these figures reflect the selective nature of faculty participation in the conferences as much as the impact of the conferences themselves, and that may be the case. But the conferences certainly played a key role in early faculty development in educational computing since they at first represented the only assistance given to a sizeable percentage of participants (see Table 2).

Summaries related to participants' study of computers after attending an ECMI conference and their perceptions of the conferences' influence on their use of computers appear in Table 5 and 6. Respondents had actively pursued further study of computers: over one-third of the respondents (35.2%) had tried to learn more about computers on their own; one-fourth (25%) had attended workshops or seminars on computers; over one-sixth (17.6%) had taken courses in computing; and one-seventh (14.8%) had done additional reading about computers. Even if the ECMI conferences were not the sole reason behind this pattern of persistent interest and further study, they at least provided a positive first experience for motivated faculty members and did not discourage subsequent efforts. Respondents' ratings of the conferences' influence on their use of computers were consistently above the mid-point of a nine-point scale: the majority of respondents whether grouped by conference, discipline group session or computer language session rated the influence of the conference above the scale's mid-point.

When asked about problems in faculty use of computers at their institutions, respondents cited a number of common problems. Among these were the absence of encouragement for faculty to learn about

Table 5

Participants' Study of Computers after ECMI Conferences

			Subsequent Activities to Increase Computer Skills							
Computer Language Session at ECMI Conference	Total		Took Courses		Attended Workshops or Seminars		Independent Learning		Additional Reading	
	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
FORTRAN	77	43.8	17	22.1	16	20.8	25	32.5	13	16.9
BASIC	83	47.2	12	14.5	23	27.7	31	37.3	10	12.0
PL/1	8	4.5	0	0	2	25.0	4	50.0	2	25.0
Other	8	4.5	2	25.0	3	37.5	2	25.0	1	12.5
Total	176	100.0	31	17.6	44	25.0	62	35.2	26	14.8

Table 6

Influence of ECMI Conferences on Participants' Use of Computers

		Conference							
	Scale Response	Total N	Total Percent	ECMI/1 N	ECMI/1 Percent	ECMI/2 N	ECMI/2 Percent	ECMI/3 N	ECMI/3 Percent
Total Influence	9	9	5.1	3	5.7	5	8.2	1	1.7
	8	22	12.5	6	11.3	8	13.1	8	13.8
	7	40	22.7	11	20.8	12	19.7	17	29.3
	6	23	13.1	6	11.3	7	11.5	9	15.5
	5	34	19.3	10	18.9	17	27.9	6	10.3
	4	12	6.8	2	3.8	3	4.9	7	12.1
	3	16	9.1	9	17.0	4	6.6	3	5.2
	2	12	6.8	5	9.4	3	4.9	3	5.2
No Influence	1	5	2.8	1	1.9	2	3.3	2	3.4

and use the computer (21.6%), the demands of administrative rather than academic computing (17.0%), lack of knowledge about computers (13.6%), and no computer or terminal (5.1%). But sixty-one respondents (34.7%) cited problems other than those anticipated by the response alternatives in the questionnaire. These centered on a need for further faculty development on campus, usually in the form of release from a heavy teaching load, and on a need for more terminals on campus. These same themes, needs for further faculty development in computing, for faculty release time and for more terminals, were apparent when respondents gave their opinions about their greatest needs in answer to another question.

Conclusions

These responses to follow-up questionnaires on the ECMI conferences generally show that participants reacted favorably to the conferences, tried to increase their knowledge of computers after the conferences, and began using computers in their courses. The extent to which respondents activities related to computers can be attributed to the conferences, however, is unclear. Participants in the conferences probably represented a select group of faculty from minority institutions already interested in computers and motivated to learn about educational computing, and respondents to the questionnaires could be an even more select group of faculty. At least the conferences provided a positive first exposure to computer uses in education and at most they provided the impetus for considerable further work in developing and using computers in courses.

From respondents' comments it is evident that they perceived a need for further faculty development in educational computing, for faculty release time to develop computer applications at minority institutions, and for larger numbers of terminals on campus. Greater faculty familiarity with computer uses and implications in specific disciplines would be consistent with the increasing importance of computing in career fields and daily routines. Similarly, direct access to computers through terminals and through keyboards on stand-alone microcomputers has begun to replace indirect batch access in academic environments. And faculty release time is probably a necessary condition for promoting further classroom computer applications. But institutions should plan each of these steps so that they complement one another and build toward appropriate and attainable goals for educational computing, whether computer-assisted instruction, computer-managed instruction, computer literacy or computer science, for the institution.

Appendix

Questionnaire Forms

ECMI/3 REVISITED - 9 MONTHS LATER - PARTICIPANTS' QUESTIONNAIRE - 1/9/78

(Circle the ONE best answer to each question unless instructed otherwise. Anonymous!)

(1) What do you feel your participation in ECMI/3 did for you?

(A) Acquainted me with the computer and its uses in my discipline
(B) Enabled me to do a better job of writing a proposal (or participating in planning) that was computer related
(C) Enabled me to teach better in the sense that I could at least talk about computers
(D) Enabled me to use the computer in one or more courses
(E) All of the above

(2) Since ECMI/3 I have had the following experiences (circle all that apply):

(A) Wrote a proposal (or participated in planning) that was computer related
(B) Used the computer in one or more courses to illustrate concepts
(C) Used the computer in one or more courses to score and/or analyze test questions
(D) Mentioned computers in connection with some material covered
(E) Never mentioned or used computers in my teaching

(3) At this point which of the ECMI/3 activities seems to have helped the most?

(A) Discipline group sessions
(B) Language sessions
(C) General sessions
(D) All of these
(E) Other (explain: ______________________________)

(4) What is your assessment of the benefit to you and your students of your participation in ECMI/3?

(A) Waste of time
(B) Somewhat worthwhile
(C) Fairly worthwhile
(D) Worthwhile
(E) Very worthwhile

(5) In what discipline did you participate? ______________________________

(6) In what language did you participate? ______________________________

(7) Did you learn enough about computing in your discipline to enable you to continue self study in computing?

(A) Yes
(B) No

(8) To what extent did you continue self study in computing?

(A) I took one or more courses in computing after ECMI.
(B) I tried to learn more on my own.
(C) I attended an additional workshop or seminar.
(D) I did some additional reading.
(E) Not at all.

(9) Have you worked actively since ECMI/3 to initiate or further develop academic computing at your institution?

(A) Yes (my school has no academic computing facility).
(B) Yes (to improve existing academic computing facility).
(C) Yes (to make new or better use of the existing facility).
(D) Yes (other—explain: ______________________________).
(E) No.

(OVER)

(10) To what extent did ECMI/3 help you to work actively to initiate or further develop academic computing at your institution?

(A) It was the only help I got.
(B) ECMI was the most important of two or more influences (name the others: ______________________________).
(C) ECMI was a factor, but it was less important than another (or other) influence(s) (name the others: ______________________________).
(D) ECMI did not help at all, because I had no opportunity to do anything.
(E) ECMI did not help at all, even though I had an opportunity (explain: ______________________________).

(11) To what extent do you feel another ECMI conference would benefit your institution?

(A) Greatly (explain: ______________________________)
(B) Much (explain: ______________________________)
(C) Some (explain: ______________________________)
(D) A little (explain: ______________________________)
(E) Not at all (explain: ______________________________)

(12) At my institution we have the following problems with computing (check all that apply):

(A) We have no computer and no terminals.
(B) The Administration crowds us out when we need to use the computer.
(C) There is a lack of knowledge about computing.
(D) No one encourages the faculty to learn about the computer or to use it.
(E) Other (explain: ______________________________)

*(13) Please use the space below to describe as well as you can:**

(A) Academic computing plans at your institution

(B) Any additional comments you care to make

* *(Continue on additional sheet if necessary.)*

ECMI PARTICIPANTS FOLLOW-UP QUESTIONNAIRE

DECEMBER 3, 1979

1. What is your current occupation, if different during your participation in ECMI? ______________________________

2. What is the extent of your participation in ECMI? *(Circle where appropriate)*

   A. ECMI/1   C. ECMI/3   E. Other (specify): ______________

   B. ECMI/2   D. ECMI Summer Workshop   ______________________________

3. In what discipline(s) did you participate?

   A. ______________________________ B. ______________________________

4. In what language(s) did you participate? *(Circle where appropriate)*

   A. FORTRAN   C. PL/1

   B. BASIC   D. Other (specify: ______________________)

5. What is your assessment of the benefit to you from your participation in ECMI(s)? *(Circle one response)*

   A. Very worthwhile

   B. Worthwhile

   C. Fairly worthwhile

   D. Somewhat worthwhile

   E. Waste of time

6. Which of the following best describe problems concerning the faculty computer situation at your school? *(Circle where appropriate)*

   A. We have no computer and no terminals.

   B. The Administration crowds us out when we need to use the computer.

   C. No one knows much about computing.

   D. No one encourages the faculty to learn about the computer or to use it.

   E. Other (explain): ____

   ____

7. To what extent do you use computers in your academic work?

   A. Use it in one or more courses to illustrate concepts.

   B. Use it in one or more courses to score and/or analyze test scores.

   C. Use it in connection with research projects.

   D. Sometimes mention computers in connection with some material covered.

   E. Never mention or use computers in my academic work.

   F. Other (explain): ____

   ____

(See also other side)

8. To what extent have you increased your knowledge of computers since ECMI?

A. Took one or more courses in computing *(Circle where appropriate)*

B. Attended workshop(s) or seminars

C. Tried to learn more on my own

D. Did some additional reading

E. Other (explain): ______________________________

____

9. On a scale of 1-9 rate the influence of your participation in ECMI(s) upon your use of computers. *(Circle one)*

NO INFLUENCE								TOTAL INFLUENCE
1	2	3	4	5	6	7	8	9

10. My two greatest computer-related needs are:

A. ______________________________

B. ______________________________

11. My school's two greatest computer-related needs are:

A. ______________________________

B. ______________________________

12. List your institution's plans for academic computing* *(if none, state none)*:

____

____

____

____

____

____

____

---

* *The term "academic computing" does NOT include computing for the registrar, business office, etc. It does include computing for students, faculty, classroom, etc.; i.e., for instructional or instructional management purposes.*

APPENDIX F

ON-SITE CAMPUS INTERVIEWS

INTERVIEWS ON ACADEMIC COMPUTING CONDUCTED AT SELECTED MINORITY CAMPUSES

DESIGNED BY: Hugh Poynor
Poynor Computer Applications
6372 West 82 Street
Los Angeles, CA 90045

INTERVIEWS CONDUCTED BY:

INSTITUTION	EVALUATOR	STEERING COMMITTEE MEMBER
#1	JAEGER	WATKINS
#2	ALDERMAN	WILLIAMS
#3	POYNOR	MARTIN
#4	MCALPINE	LEWIS
#5	POYNOR	MARTIN, BARRERAS
#6	JAEGER	WATKINS
#7	--	MARSHALL
#8	MCALPINE	JONES
#9	ALDERMAN	MILLER

SUMMARIES WRITTEN BY:

Sister Patricia Marshall
Xavier University of Louisiana
New Orleans, LA 70125

Thomas W. Mason
Head, Data Processing Technology Department
Florida A. & M. University
Tallahassee, FL 32307

INTERVIEWS ON ACADEMIC COMPUTING
CONDUCTED AT SELECTED MINORITY CAMPUSES

Hugh Poynor (Designer)
Poynor Computer Applications
6372 West 82 Street
Los Angeles, CA 90045

Report #1: ACADEMIC COMPUTING:
A SAMPLER OF APPROACHES
IN MINORITY INSTITUTIONS

Presented at NECC/2
National Educational
Computing Conference 1980
by Sister Patricia Marshall
Xavier University of Louisiana
New Orleans, LA 70125

Report #2: ADDITIONAL OBSERVATIONS
AND SUMMARY

by Thomas W. Mason
Head, DP Technology Department
Florida A&M University
Tallahassee, FL 32307

Report #3: INTERVIEW KIT AND QUESTIONS

by Hugh Poynor (see above)

These interviews were conducted on nine minority campuses as part of a data-gathering activity for the report entitled "Instructional Computing in Minority Institutions: A Needs/Strategy Assessment," Sister Patricia Marshall, Principal Investigator. The entire study was funded by the National Science Foundation (NSF SPI 7821515).

REPORT #1

ACADEMIC COMPUTING:
A SAMPLER OF APPROACHES
IN MINORITY INSTITUTIONS

Sister Patricia Marshall
Xavier University of Louisiana
7325 Palmetto Street
New Orleans, LA 70125

A variety of post-secondary minority institutions using a variety of approaches to academic computing were interviewed campus-wide and in-depth late in Fall 1979. These interviews were part of a larger assessment of needs in educational computing at 239 minority institutions. (1)

Faculty, students, and administrators were interviewed on computing development, usage, problems, and successes. Diverse approaches were discovered, corresponding to philosophic, demographic, geographic, historical, political, and cultural factors.

The institutions were selected in order to obtain as broad a cross section as possible within time and financial limits and parameters such as ethnic composition, type of control, date of establishment, highest level of offering, academic orientation, enrollment, type of access of hardware, and experience. While not all of the most successful institutions were chosen, we did try to include schools which would not feel threatened by the interviews and which had had enough experience to identify factors inhibiting and promoting progress. Consciously excluded were such institutions as the Universities of Hawaii and Puerto Rico, partly for financial reasons and partly because they are so much larger than minority institutions in general. The table on the next page lists the institutions interviewed and some key parameters used in their selection. For confidentiality we identified them only by number. We will report here on four of them.

Institution #1

Institution #1 is an Eastern seaboard, public, urban two-year, three-fourths black institution established after World War II. It enrolls over 9,000 students in day and evening divisions. Two campuses, one emphasizing technical studies and one evolving toward a focus on business studies, are united under one administrative structure. Large numbers of minority students began to attend this school early in the '70s as a result of outreach by the institution. The stable faculty consists of only 28 percent minorities. Although this institution may appear small by national standards, it is one of the largest of the minority schools and one of the few two-year colleges with any large degree of experience and planning in academic computing.

Unencumbered by the weight of tradition and spurred by local employment needs, Institution #1 had established a separate academic department for data processing by the early date of 1965. This department, now called Computer and Information Systems (CIS), attracts 300 majors and graduates about 25 each year with an associate degree in computer studies. Four full-time and numerous part-time faculty staff the department.

The school has weathered three hardware phases and is entering its fourth. Initially an IBM 1620, acquired for the data processing department in 1965, was the only computer. A committee from electronics, data processing, and administration hired a manager of computer services and developed specifications for a UNIVAC 9300, which arrived in 1968. The college allocated its funds to lease it and pay support staff for administrative services. Departments and individual users, however, have never been charged.

1972 brought a UNIVAC 9480 (131K) with four terminals for administrative data entry and inquiry. COBOL, RPG, and FORTRAN were supported for students, as well as ASSEMBLER (on the 9480 and the 1620). This UNIVAC is still used for student batch runs. In addition, ten ports were rented in 1975 on a companion community college's HP 2000, an arrangement that was terminated in 1979 in favor of access to a DEC 10 at a nearby private university. Students use ten DecWriter terminals which are dedicated during labs for a course in BASIC and used for other courses during open times.

The CIS faculty purchased five micro-computers in Fall 1979 through a Title VI grant. These have replaced the 1620 in teaching assembler languages and computing principles.

A fourth system is under consideration now because of the two campuses, growth of institutional and faculty research, and growing concern for academic computing. The institution had done its own local needs assessment before considering such a step.

Thus, this institution has steadily built its computing capabilities, if at a slower pace than some majority institutions certainly also at a faster pace than most minority and/or two-year institutions. This stable growth has resulted from support by the college of increases in computing capabilities through its own funds, supplemented by aggressively sought federal grants. Because of its careful planning and budgetary practices, the school will be able to assume ancillary costs when grants expire.

Factors influencing the expansion of computing capabilities at this institution have been the local employment market, size of the student body (necessitating automation in record handling and giving early exposure to administrators and faculty), support by administration, key faculty members with interest and dedication to supplement the budget for computing resources, and explicit planning mechanisms within the college charged with studying computing needs.

Administrative support is evidenced by hiring practices, release-time practices (for proposal writing and planning), and activities involved in acquiring computing equipment. A few key faculty members have visited other successful sites, attended conferences (ECMI (2) and others) and conventions, served on committees in professional associations, sought external funds, and lent one another intellectual and moral support. The evaluator who conducted the interviews at this community college commented:

> These individuals represent a scarce resource at any institution and seem to represent a necessary if not sufficient condition for progress in academic computing. (A broad base of faculty awareness is probably not a necessary condition for growth in an institution's computing capabilities.)

Periodic _ad hoc_ committees on computer utilization further exemplify the planning mechanisms for computing established within the college. Plans also exist to establish a line position for a director of information systems reporting to the president through a dean of planning, development, and communications. This new position would assume responsibility for academic, as well as administrative computing.

Tensions have existed between administrative and academic computing, as at many other institutions. The manager of computer services reports to the vice-president for administrative services. The CIS Department, on the other hand, is within the Division of Business, Secretarial, and Computer Sciences under the vice-president for academic and student affairs. Support staff have grown through several stages to the current manager of computer services, three programmers, two keypunchers, and two computer operators. No students are employed since the manager claims "it doesn't work."

Students submit batch jobs through a slot in a door. Output pickups are scheduled twice daily for fifteen minutes each. However, during the two lab hours assigned each course in a batch-mode language, turnaround time is closer to immediate. Students--who probably know of no other alternatives--accept the pickup arrangement, complaining only about the number of keypunches. Terminals are available for learning BASIC, and the APPLE microcomputers were made available in Spring 1980 for learning ASSEMBLER. The commercial option in CIS will be offered at the campus nearest the business community and the scientific option at the other campus. Academic applications exist also in the business department (managing data on patient care and student performance). CMI(3) is expected to be developed in remedial reading and CAI(4) in science courses after the new configuration is installed. Faculty with a good track record in attracting federal grants will be responsible for developing CAI at the science learning center. The project director for the science learning center had attended an ECMI conference and attributes his current grant, in part, to that experience.

Institution #2

Institution #2 is a private, women's four-year, historically black, liberal arts college with a tiny, though stable, enrollment of about 600. Located in a mid-Atlantic city, the institution houses its computing hardware in one attractive location on campus. This hardware includes an 8K IBM 1130 batch system used for administrative purposes and student programming courses and an interactive HP 2000 with fifteen terminals used extensively for CAI tutorial and drill and practice in mathematics, English, and biology. Two of four keypunches are available to students.

Computer center hours are 8 a.m. to 10 p.m. (Saturdays on request), and consultation is available during these times. Freshmen receive computer ID numbers at the beginning of the school year, but upperclass students have open-shop, direct access to both computers. They run their own decks and retrieve their own output immediately; however, lines do develop when the business office is running at the same time on the 1130. Tables are provided students in the computer center for such use as examining output and correcting programs.

Reports on the success of the CAI project, in which faculty prepare courseware (or modify existing courseware) using IDF, have been given at CCUC(5) and ECMI(4) conferences; a great deal of consulting and sharing with other colleges has also taken place. In addition, this college has been cited as an academic computing exemplar by HumRRO(6).

Computing began at the institution eleven years ago. A rented teletype connected the college to TUCC(7) and provided for some instructional work, as well as for improving computer literacy of the faculty. Influential in establishing the initial capability were the president of the college (who later attended an ECMI conference) and the mathematics department chairperson (who later became the computer center director). A year later, the college purchased the 1130 through a federal grant in connection with another university. This computer was used, from the beginning, for both administrative and academic purposes. It was also used cooperatively by two other small, church-related, primarily white institutions in in the same city. All three schools used it for registration processing. Five years ago a Title III grant made possible the purchase of the HP 2000 with fifteen terminals for CAI development. Basic skills disciplines accounted for early CAI use; CAI is built into course requirements in these disciplines.

The success here with CAI has given rise to new problems. Students need twice as many terminals, and the 1130 is too small and is no longer supported by IBM. Additional personnel trained in computing are needed. Release time for faculty is needed to development additional CAI courseware. Despite the success, the support of the president, and the small size of the institution, some faculty are still unaware of the potential in their disciplines. In such a small school, this is seen as a problem by faculty who do use the computer.

Attendance of ECMI conferences helped to develop a strong team of faculty, however, who have used instructional computing heavily. Through a federal grant the institution began to share its expertise in Spring 1980 by conducting a regional conference similar to the ECMI conference. The college collaborated with Institution #4 in conducting that conference. Thirty small colleges participated.

One faculty member cited CAI as extremely helpful to entering freshmen, so many of whom are in need of remedial work due to inadequate preparation in secondary schools. Students said they appreciated the CAI but not the downtime.

The president of the institution would like to see separation of administrative and academic computing. Plans for upgrading the existing hardware are on the drawing board.

Despite its small size and its dependence on hardware and software that are less than state-of-the-art by today's rapidly changing standards, this institution has taken a position of leadership in the development of transportable courseware for use in basic skills courses. Success has brought with it new problems, but it has also nurtured confidence, plans, and determination to solve the problems.

Institution #3

Institution #3 is a technical-vocational, two-year, Hispanic institution located close to the Mexican border. One of four such institutions comprising a state system, this school was established on a World War II air force base in 1967. Its fast-growing student body numbered well over 1,100 at the time of the interviews, and some of the growth is in the data processing program.

Curriculum design is a high-priority and on-going activity at the school, as evidenced by its special staffing and the existence of school-industry cooperative committees and advisory committees. Annual evaluation ensures that curricula are up to date and graduates are well prepared for employment. (Some students command entry-level salaries as high as $18,500 without graduating.) Just minutes away from this institution are vast farmlands on which thousands of Mexican Americans barely survive. Thus the existence of an industrial corridor and this institution to serve it is pivotal to economic change in the area. (On the first day of the interviews here the Wall Street Journal stated that this region was one of the four fastest-growing industrial areas in the country.)

A new building houses the computing and electronics programs and computing facilities, as well as some other mathematics and science or technical programs. Nearly one-third of its 17,000 square feet is occupied by computing facilities and classrooms used in the industrial data processing program (IDP). Prior to the interviews (just two weeks after the move to the new building) less than a fourth as much space had been available.

IDP students dominate the facility, which, like the entire campus, is outstandingly clean and well organized. Terminals are dedicated to students, or to entire classes, from 8 a.m. to 5 p.m. Often the facility is open till 6 because the IDP chairman stays late. Since most students are Mexican-American undergraduates who live with their families in the area and are not accustomed to being away in the evenings, the facility is not kept open at night. A demand does exist, however, from working adults in the area for an evening program. Finances and staff are the obstacles to be overcome.

Two instructors are employed in the IDP program, one the chairman. An additional slot is open but not filled. The two instructors bear heavy teaching and lab loads, with most emphasis on lab work. They share the burden of supervising the facility. Second-year students are trained not only to program (and maintain programs) for some administrative and academic applications, but also to assist as consultants to first-year students when instructors are unavailable.

The IDP chairman has spent much of his own time on outreach to other departments, providing demonstration projects, seminars, and classes. The degree of interest from other departments likely to use the computer for instructional purposes ranges all the way from "take it away" to "you can't begin to meet MY needs." Those least interested are traditional instructors. In programs using individualized instruction (or in which instructors have had previous experience), faculty are eager to attempt computer-managed instruction or computer-assisted test generation. Attitudes appear to stem from educational philosophies rather than from familiarity with areas of expertise, such as nuclear technology or mathematics.

Two weeks after the move to the new building, when the interviews were conducted, a terminal room contained ten CRT's, two teletypes, and a line printer in fairly constant use. A Radio Shack TRS-80 and an IMSAI 8080 microcomputer were also available. Six additional CRT's, a printing terminal, a digital plotter, and a tape drive were also being readied for use. Three keypunches with acoustical shells were available. Bulletin board displays included charts, lists, schedules, computer-generated Mona Lisas, and a sign proclaiming "The Dirty Dozen." ("The Dirty Dozen," it turned out, were the second-year students who had survived out of a much larger original field of beginners in the IDP program.)

The terminals were on-line to a DEC PDP 11/70 located in a department store 45 miles away. COBOL is not the latest (1969), and RPG card decks are sent to a DEC 10 at a university 50 miles away, with a turnaround time of weeks. But students are obviously learning and being hired. The IDP department, having grown from four students in 1974 to more than seventy at various levels of advancement at the time of the interview, has gone through several upgrades of remote connections. Current plans call for an on-site computer with 32 ports for student use. However, instructors who want to support individualized instruction, record keeping, and test generation in open-entry/open-exit courses feel they may still not have sufficient capacity since they would be in contention with IDP for use of the resources. Meanwhile administrators are working on additiona capacity for administrative work (remote access to a large state institution's network.)

One instructor has done some work of his own, some of which was destroyed in one of the upgrades. Most recently he has been using a TRS-80 microcomputer on his own time. He envisions a cluster of micros in a classroom, which he sees as a cost-effective solution to his problems in a tradition-oriented department. The electronics program, which trains almost a hundred students for customer engineering on DEC equipment dedicated to the program, can use twice as much hardware. The chairman of this program, a former ECMI(2) participant, keeps up with hardware periodicals and literature but is far too busy to move into academic computing generally.

Students who are beginners tend to see no problems with existing hardware and software, but the advanced "Dirty Dozen" talk like data processing managers. Completely at ease in the jargon and what's behind it, they speak knowledgeably about the shortcomings of the available software, the need for this version of a language and that many ports, and even the additional justification needed in the current proposal for new equipment.

Administrators give moral support, but their budget requests have to move through several layers of state bureaucracy and compete with other technical institutions. Even when funds exist, it is difficult to find qualified staff in the area who are not already working for burgeoning industries at high salaries. Nevertheless, the industrial data processing program grows, and other departments are beginning to voice their needs. Among two-year technical schools, this institution may be on its way to becoming an academic computing exemplar.

Institution #4

Institution #4 is a state-controlled, four-year master degree-granting, black institution, with liberal arts and some engineering emphasis. The enrollment is 5,400 students. Located across town from Institution #2, this school was the last (and only minority) institution to procure a mainframe computer through the National Science Foundation's original

Office of Computing Activities. That computer was a CDC 3300, and it followed the first computer acquired in 1964, an IBM 1620. It was replaced by a DEC 10 in 1977. Federal and state funding were combined in each of the latter two cases, with the CDC being sold to add to the funding for the DEC.

Although some impetus came from the computer center (especially recently), a key role was played by a former dean of arts and sciences after whom the computer center is now named. More than 80 terminals are on-line to the DEC 10, 26 of them in the computer center A variety of languages are available: BASIC, PASCAL, APL, COBOL, ALGOL, LISP, and others. The computer is available around the clock all week. The staff includes nine programmer/analysts, and experts are available to faculty and students as needed. Students access the computer interactively through class accounts or individually (both authorized by departments) as well as by batch jobs. A monthly report provides usage information but is not currently used for charging. Most use is by students in coursework, but faculty do research, and administrative applications abound. Turnaround time is good except at peak times. Jobs are limited to fifty at a time, which can cause a connection delay of ten-to-fifteen minutes. Work space in the computer center for students is also limited.

During the past two years Institution #4 has experienced what the computer center director refers to as "a quiet revolution" in computing. From a single-job, batch-mode machine with 49K main memory and 25 megabytes of disk, the university took a quantum leap to 256K, 600 megabytes of high-speed disk, and the ability to process up to fifty jobs at a time in many languages interactively, in batch mode, or in combination.

However, increased demand for computer time has lowered response from excellent to poor. Engineering, which six months before the interviews could run circuit analysis, finite element, operations research, and other sophisticated jobs at any time, must now normally execute many of these between 5 p.m. and midnight, and several between midnight and 8 a.m. Engineering school jobs also include CAI packages needed for educationally disadvantaged students, and it is difficult to find time during the day to run them. Plans are afoot for a memory upgrade at $100,000, half of which must be raised from outside the university budget. Further upgrades will probably include a remote-site laboratory and a processor upgrade. Staff and space needs were cited in addition to hardware and stations for remote access.

An active computing advisory committee, chaired by a chemistry professor, functions as an agent of change and supplements positive pressures from all types of users and administrators. Proposals have been written, and a computer science degree program is to be launched in Fall 1980. An academic computing director and an administrative computing director will also be hired.

Some usage came about through participation of faculty at ECMI conferences(2), where they learned about MINITAB, test assembly and scoring, test item banking, and CAI, all of which are now used. Although most usage is by the engineering school, other departments (especially mathematics, chemistry, and business) are becoming active users. The list has expanded each month in the last two years. Electrical engineering has also developed several microcomputers for instructional use and an HP 1000 that is used for instructional purposes and research in upper-level courses.

Instrumental in the growth of computing in engineering at this university has been an engineering accrediting agency, according to some faculty. Employment of faculty by local industry was a factor in initially creating awareness of computer potential among engineering faculty. ECMI conference attendance is credited with increasing awareness among mathematics, chemistry, and business faculty.

Political problems associated with federal efforts at encouraging integration have caused difficulties in maintaining orderly development of academic computing, according to some. Also cited as a negative factor was the pattern of federal funding which historically favored mainstream institutions and left out minority institutions. This is one of the few minority institutions, however, that managed to begin to beat the system as early as the '60s.

Conclusion

In the cases of the institutions described above, though a variety of approaches have been made toward academic computing, certain factors surface as common ingredients of success. These include campus-wide planning (or at least planning beyond the walls of a single department or class), dedication on the part of key faculty or administrators, careful budgeting practices, the ability to put together funding from various sources, the ability to learn by experience (as well as by capitalizing on the experience of others), and the will to get maximum mileage from the resources at hand. Interestingly, historical factors that could have defeated some actually seem to have caused these institutions to try harder.

References

(1) Needs/Strategy Evaluation of Minority Institutions in Educational Computing (NSF Grant No. SPI-7821515, in progress)

(2) ECMI (Educational Computing in Minority Institutions): three working conferences and one workshop for minority institution faculty in 1975-1977 to assist faculty with little or no knowledge of educational computing to learn about it in their own disciplines. Courseware was developed by a small group at one summer workshop.

(3) CMI: computer-managed instruction

(4) CAI: computer-assisted instruction

(5) CCUC: Conference on Computing in the Undergraduate Curricula (annual, 1970-1978)

(6) HumRRO: Human Resources Research Organization.

(7) TUCC: Triangle Universities Computing Center

REPORT #2

ADDITIONAL OBSERVATIONS AND SUMMARY

Thomas W. Mason
Head, DP Technology Department
Florida A&M University
Tallahassee, FL 32307

Introduction

This report is both a continuation and an expansion of the analysis of data resulting from an assessment of educational computing needs at 239 minority institutions (1). The first analysis by Marshall*(2) detailed the experiences of four minority institutions. Five additional institutions will be described herein but in a somewhat different format.

The descriptions of the institutions are grouped under the headings of:

Acquisition - "What do they have and how did they get it"

Diffusion - "How are they using what they have"

Synthesis - "What's needed and what's the chance of getting it"

These headings roughly correspond to past, present and future but were chosen to focus attention on the process of incorporating a new technology in an existing academic setting. This process is closely related to the general entrepreneurial process.

In the Acquisition phase, an Initiator invests considerable time and energy to acquire a new technology. If the technology is to survive past the institutional lifetime of the Initiator, the knowledge of how to maintain and use the technology must be diffused through receptive areas of the institution. Once the knowledge has been spread, it can, with suitable institutional support, be combined with the experiences of others to serve as the background for the emergence of new Initiators. This last phase is called Synthesis.

---

* (See preceding pages 1-19 in this appendix.)

Five institutions will now be considered in the structuring discussed above. The complete set of nine institutions were chosen as examples of "success stories" of educational computing in minority institutions. The intent of these descriptions and the accompanying analyses is to discover strategies for educational computing that display a likelihood for success.

The Institutions

The institutions described below will be referred to only by number since guarantees of confidentiality were given while collecting the data. The numbering follows Table 1 in Marshall's article. Since the first four institutions have been described, we start with Institution #5.

Institution #5:

This institution is a Midwestern, two-year American Indian institution which serves over 130 tribes from 38 states. The junior college is federally supported through the Bureau of Indian Affairs (BIA) and has 1,000 students instructed by 50 faculty.

Acquisition

--Machinery

Because of inquiries by local businessmen and parents, funds were sought for on-campus computing as early as 1968. However, because of federal policies governing machinery acquisitions and the apparent indifference of the BIA, a computer could not be acquired. Arrangements were therefore made with local city schools for processing administrative computing needs -- institutional recordkeeping and grade reporting.

In 1971, an IBM 1401 computer was donated to the institution. Although the peripherals included disks, tape drives, card reader and printer, the computer was used to teach electronics and computer repair but not programming. However, keypunching was taught as a clerical business skill.

Within two years, CRT's had been acquired to use a remote computer center, and the institution had begun to use computer-managed instruction (CMI) in reading courses. Since 1974, IBM has provided an employee to teach, first, computer repairs and now, programming. Furthermore, in early 1979, the college acquired a PDP 11/34 (256K, 5MB disk) with private funding. The college has set aside $50,000 for support operations, additional terminals, a tape drive and a card reader.

--Initiator

The drive to acquire the computer was initiated by the dean of instruction, the vice president and the president. The actual acquisition is credited to program development officers (who had been given the task of finding a way of sponsoring the machine) and the president's leadership.

Diffusion:

--Management

A computer committee is chaired by the assistant Dean of Instruction and consists of program development officers and selected faculty members. Eventually, the director of institutional research will chair the committee. The committee's primary task is to get a computer center director. The BIA has approved the position of director but at a level $10,000 below reasonable market demands.

--Operations

Staff support is nonexistent. The computer center is staffed voluntarily by faculty who contribute evening hours on a rotating basis. This allows student access of approximately 14 hours per day using 13 terminals of various types.

--Software development

Six faculty members have taken the lead in voluntarily developing software in addition to that supplied by the vendor. Primary effort is being put forth to develop rather than adapt existing courseware and instructional programs. In this way the idiosyncracies of the PDP 11/34 can be learned. Adaptation of existing courseware from other institutions seems likely to occur later.

--Curricula/Special programs

The college offers both technical/vocational and academic preparation programs. The Data Processing program is part of the Business Division and includes courses in RPG and COBOL. The popularity of programming as a major is increasing, and the students are proud of "their" new computer.

The CMI reading program has been transferred to the 11/34 and is heavily used. There are additional plans for on-line testing, tutorials and additional CMI-based courses.

Synthesis

--Needs

There is an immediate need for a computer center director and a full-time programmer. The faculty are now becoming interested in using the computer and are beginning to request release-time for courseware development, in-service education and more information about the use of computers in their disciplines.

Analysis:

The institution has emerged successfully from the Acquisition stage but is mired in the process of Diffusion. Experience has shown that faculty will spurn a new technology rather than become frustrated by it. Therefore, without a permanent director, the voluntary efforts of the faculty will eventually cease and new projects will be abandoned. The computer will then be used only by those areas for which it is essential. An opportunity to significantly impact the institution will be lost.

Institution #6:

This private, 4-year, liberal arts, predominantly black, urban institution has existed for more than 100 years. There are approximately 1,500 students which makes it an average-size minority institution.

Acquisition:

--Machinery

The first computer (IBM 1130, 8K) was obtained in 1966 replacing two remote terminals. Subsequent upgrades of the 1130 (to 16K memory in 1968) and the acquisition of a DEC PDP

11/40 in 1974 were funded by grants from the National Science Foundation. Both the IBM 1130 and PDP 11/40 are currently used with multiple disks, card readers, line printers, plotters, tape units and a total of 21 terminals. At the time of the interviews, delivery was anticipated of a PDP 1103 to be used for research, data analysis and monitoring.

--Initiator

The initiator of all acquisition activity since 1968 is both chairman of the computer science department and director of the computer center.

Diffusion:

--Management/Operations

The center is largely "held together" by the director who is also chairman of the computer science department. He is the person the faculty turn to for assistance in getting relevant software. He is also responsible for making the 1103 operational.

There are student helpers but no full-time consultant to assist students with specific problems. Also, there are no full-time operators for academic computing even though the institution employs three full-time employees for administrative data processing.

The center is an open-shop operation, available 150 hours per week. The computers are unattended at least a third of that time. The system is functioning near capacity. Student programmers, particularly computer science majors, are active throughout the day and night.

--Curricula/Faculty

There is little interest on the part of most faculty to become involved in the system other than as users. Unlike most minority institutions, most users are researchers who have only recently become interested in instructional computing. Most of the faculty are not aware of the historical development of the campus computer capability or the recent changes. In general, their interest in computing extends no farther than the boundaries of their laboratory, or classroom or, at the most, their department. Their response to the current problems -- overcrowding at the center, low level of instructional computing -- is to add more terminals, especially in research labs.

Synthesis:

There are obvious needs in attaining managerial and operational support. Furthermore, the system is essentially saturated. Additional memory and disks are needed to improve response time. The president has been made aware of these needs and is supportive of instructional computing efforts, but his administrative council supports improvements for administrative computing only.

Analysis:

Although this operation is almost 15 years old, the institution is still in the Acquisition phase. The reliance on the Initiator is almost total. Hardly any initiative has been taken to diffuse either knowledge or responsibility to form a more stable operation. Since this situation has existed for so long, it may take a traumatic event to significantly change the operation.

Institution #7:

This private, Southwestern, two-year institution was established in 1969 and is the first Indian-owned, Indian-operated, accredited college on a reservation. There are 400 students on the main campus and 74 full-time faculty. The school grants Associate of Arts, Associate of Science and Associate of Applied Science degrees in many areas, including computer science.

Acquisition:

--Machinery

Automatic Data Processing has been available since the college first opened. For the first six years, remote computers were accessed with terminals, but in 1975 a DEC PDP 11/40 was obtained. A year ago, that machine was upgraded to an 11/70.

--Initiator

To the administrators, computers are important for administrative computing. Growth is also planned for academic computing but the increasing administrative computing load was the spur that led to the original acquisition of the PDP 11/40 and also to its subsequent upgrade to an 11/70.

Diffusion:

--Management

The head of the computer center recently left after 10 years. He was instrumental in making the computer center useful for academic computing.

--Operations

The computer center staff is small but "they do it all." Because of the remoteness of the campus, spare parts are stockpiled and the staff occasionally debug and replace parts of the hardware. The computer itself is available 24 hours per day, but student terminals are located in buildings which are locked at night. Some faculty/staff members have terminals in their offices, and a few have them in their homes.

In reflection of the emphasis on administrative computing, until recently, the largest group of students in Computer Science classes were college staff learning how to operate and program the computer in the performance of their jobs. Further, a number of commercial application packages have been purchased for interested users.

--Curricula/Faculty

Expertise in academic computing is noticeably lagging behind its commercial cousin. Although a few non-computer science faculty have developed their own courseware, most are still wating for training sessions and the availability of programmers.

The institution has converted its instructional program from data processing to computer science. The number of majors has decreased. Students reported that the course was a difficult one and the students' backgrounds were so lacking in the rudimentary skills of computer usage that it was nearly impossible to comprehend algorithm development, structuring methods, etc.

Synthesis:

The institution is quite pleased with their current equipment. Continued satisfaction, especially in the academic area, will depend on how quickly a new director is found and the commitment of the new director to training.

Analysis:

This institution has very successfully diffused knowledge in the administrative computing sector. Similar strategies could be used for academic faculty. Although very young, this institution has much to teach many of its fellow minority counterparts about the successful infusion of a new technology.

Institution #8:

This private, rural, black institution offers bachelor's and master's degrees and has programs in both liberal arts and engineering. Approximately 3,300 students are enrolled at this institution which is nearing its centennial celebration.

Acquisition:

--Machinery

Instructional computing began 20 years ago when a $20,000 National Science Foundation grant was used to acquire an IBM 1620 batch computer. Eight years later, an HP 2000 interactive computer was bought with grant funds. More recently, a time-sharing agreement was entered into with a neighboring, large, non-minority institution. This arrangement is to allow access to an IBM 3031. There are 65 terminals (15 DECWriters, 34 TTYs and 16 CRTs) located campus-wide and many can be used to access the 3031 as well as the HP 2000.

--Initiator

The engineering program has historically taken the lead in computer acquisitions and management.

Diffusion:

--Management

Until recently, the computer center was administered by a most knowledgeable and highly-respected individual. He has since left for a more lucrative position in industry.

--Operations

The center is organized as an open-shop operation. There are no full-time operators (administrative computing has a System/3 with two full-time operators), nor are there specially assigned consultants other than the computer center director.

Student usage is extremely heavy. In addition to the 75 computer science majors, most areas of science use instructional computing along with veterinary medicine, agriculture and a very heavy usage in sociology (simulation, data reduction, analysis and statistics). Student complaints center on the availability and down-time of terminals and the inadequacy of the workspace. Those complaints are offset, however, by their appreciation of the instructional computing content of their courses.

--Curricula/Faculty

Educational computing is definitely an integral part of the instructional activities at this institution. In recognition of this, there is general dissatisfaction among all elements of faculty users. The present system is essentially saturated. The arrangement to use the off-campus IBM 3031 is apparently not working to anyone's satisfaction. Every engineering faculty member uses the computer. The physics department would like to develop or adapt CMI and CAI packages but the present facility will not accommodate them. One chairman declared the growth in student computing was "exponential."

Synthesis:

--Plans

A campus-wide task force has been identified to assess instructional computing and alternatives for upgrading the system. Administrators are considered supportive but without funds.

Analysis:

This institution has successfully diffused knowledge of and access to the central computer to the point of saturation and frustration. The next step should be decentralization.

Institution #9:

This public, 4-year institution is a branch campus of a large university system. Its 4,300 students are two-thirds black and one-tenth Hispanic. The college has been under severe financial pressure since the governing political body was faced with bankruptcy. Alternatives were considered to either eliminate the institution or reduce it to a 2-year program. The institution responded by releasing faculty members in liberal arts and developing academic programs with a career orientation. One of the programs to be instituted will be in management information systems.

Acquisition:

--Machinery

The University System has a central computing center which all member campuses must use. This provides access to an Amdahl 470, an IBM 3033 and an IBM 3031. The institution has a remote job entry station and 18 terminals but no resident computing power.

Diffusion:

--Management/Operations

The computing activity is under the very casual management of a computer activities "coordinator" who is a faculty member getting one-fourth release time for this function. In addition, there is a full-time programmer and the equivalent of a half-time student assistant for student consulting.

Decisions about acquisition and usage are made at the System level. The institution has representatives on the two most important advisory committees -- the policy committee and the committee for instructional computing.

--Curricula/Faculty

There is a very small program in computer science in the mathematics department. Using a CAUSE grant from the National Science Foundation, computer-assisted instruction has been incorporated into physics and basic science courses and computer-managed instruction has been used in chemistry courses. Altogether, some 2,000 students use the computers each academic year.

Although computer usage is small compared to older, larger branches of the University System, this institution with its CAI and CMI activities is the heaviest user of interactive applications. Yet the central Computer Center has a schedule for charges which discourages interactive use. A relatively low priority for the maintenance of the on-line operating system has been assigned since there is little interactive use over the entire System. Some faculty cite this aspect of central services as justification for local processing power dedicated to instruction in science courses but there is little likelihood that the System administration will approve of the housing of a local computer. Other faculty members prefer to fight for the improvement of the telecommunications link to the central site and contend the present resources are adequate.

Synthesis:

--Plans

The commitment to develop cooperative career programs has enlisted the strong support of local businesses. However, with the fiscal uncertainty of the governing political body and the fierce competition from industry and other academic institutions, it is unlikely that the management information systems program can be adequately staffed. Tight institutional budgets will also constrain improvements in equipment.

Analysis:

The experience of this institution is quite typical of minority institutions that have been absorbed into a family of universities. The differences in educational perspective and approach almost always lead to different attitudes toward academic computing. Witness, for example, this institution's pioneering uses of interactive programming for CAI and CMI which gives rise to a central system response of discouragement and disinterest. Note also that with the relatively small computing load imposed by this institution, the response of the central center can hardly be justified on a cost basis; a policy of cooperation would probably cost no more than the present policy.

The key to effective computing for institutions in centralized systems is to attain a minimally sufficient level of local processing power. The most effective way this can be done is under the aegis of instructional research.

Summary of all nine institutions

#1 - Computing expertise has diffused through the institution. The planning process exists and opportunities are available for decentralization.

#2 - Computing expertise is strong within a segment of the university and at the top levels of the administration. Opportunities are available to spawn new computing efforts.

#3 - Still within the "initiator" stage. Potential for diffusing expertise is minimal because of the dominance of the Data Processing program.

#4 - Significant acquisition has occurred. The challenge now is to provide an effective management.

#5 - Adequate computing power exists. The need now is for effective management and administrative support of faculty development.

#6 - The computing power is not adequate but it cannot be extended until the current "one-man" management is replaced by a workable form of governance. Only then will faculty expertise be increased.

#7 - Adequate computing power. Expertise is widespread in administrative computing and could conceivably spread to academic applications.

#8 - The existing computing power is saturated but faculty expertise is sufficiently diffuse to allow efforts to decentralize.

#9 - The major source of computing power will always be the central Computer Center. Research projects are needed to obtain local processing power.

Conclusions

The nine institutional studies are illustrative of the powerful role of the Initiator. In most of the institutions, one purposeful faculty member essentially single-handedly acquired a system and made it operational. The entire job required a significant expenditure of time and effort -- many times without initial administrative support. The crucial phase, however, comes once the computer is in a usable state. The administration must then decide whether to provide an operations staff and the Initiator must decide whether to turn into a Missionary/Philanthropist. In the Missionary role, knowledge of computing use is extended to interested faculty. As the Philanthropist, the Initiator turns over effective control of the computer to an operations staff whether they be professionals, a consortium of concerned faculty, a user's committee, etc. No effective progress will occur until this "diffusion" of knowledge and control has occurred.

Recent changes in computer technology offer the potential of materially affecting the role of the Initiator. Microcomputers now exist with significant power and almost insignificant price. Therefore, future acquisition of computing power -- either as the sole source or a complement to an existing system -- can occur without "gut-wrenching" Initiator efforts that were all too common (and necessary) in the past. The low cost of these instruments allows for incremental growth that is easily accommodated by all levels of faculty expertise. Furthermore, the operational requirements are nil.

The importance of effective academic computing to the preservation and growth of minority institutions must not be underestimated. To have truly effective computing in an academic environment, the computer must be essentially "transparent" to the field. This is to say, detailed knowledge of the tool must not be essential for its use in acquiring detailed knowledge of the primary field. Also, there must be a relatively low "entrepreneurial burden" in acquiring the new technology. Otherwise, too much time and effort are expended outside of one's professional career-path with a potentially detrimental affect. The acquisition of large (and even not-so-large) mainframes has been a traumatic experience for many of the nine institutions. The acquisition of microcomputers can eliminate most of the trauma while retaining much of the effectiveness.

REFERENCES

(1) Sr. Patricia Marshall: Needs/Strategy Assessment of Minority Institutions in Instructional Computing (NSF Grant No. SPI-7821515). (New Orleans: Xavier University of Louisiana, December, 1980.)

(2) Sr. Patricia Marshall, "Academic Computing: A Sampler of Approaches in Minority Institutions," Proceedings of NECC/2, National Educational Computing Conference 1980 (Iowa City: The University of Iowa, 1980), pp. 238-244.

ECMI NEEDS ASSESSMENT STUDY

INTERVIEWER KIT

This kit contains directions for scheduling and conducting site interviews at minority colleges in the ECMI Needs Assessment Study interview sample. By following the directions you will be able to conduct interviews and observations that allow the Study to make comparisons across different interviewers at different sites.

Scheduling is of the upmost importance. Preparation is equally as important; you must know your schedule and the site itself before travelling to the college. You will have a copy of the completed ECMI Needs Assessment Questionnaire from the site, and you will be assigned a site coordinator, or prime contact, before stepping onto the campus. More about this is described next.

SCHEDULING INTERVIEWS

The sites are to be choosen by Sister Patricia with the assistance of the Steering Committee. You will be assigned to the site, given the name and telephone number of your prime contact (site coordinator), and given the approximate dates for travel. Generally, we are budgeted for one and one-half days per site and one-half days travel per site. The typical interview schedule can be accomplished in this length of time if you schedule properly. Contact the site coordinator as soon as possible.

You will have to ask the coordinator for suggestions regarding faculty and staff to be contacted for setting up interviews. This should be done after introducing yourself during the preliminary call to the site. You will have trouble contacting people because of the shortness of faculty office hours. Remember the Study is adequately budgeted for telephone expenses. The credit card number you should use is 024-6426-046Q.

Locating the Respondants

Ask the coordinator for the names and telephone numbers of suggesed respondants for the six levels you will be interviewing. When locating respondants for the six levels explain that we are seeking those faculty, staff and students having at least a modest awareness of campus computing. We do not want a random cross-section because the largest proportion of respondants at the minority campuses are likely to be uninformed and would not add to our understanding of educational computing at the sites. Remember, the interviews should provide in-depth information for our Study. The number of respondants at each level are listed below.

1. President
2. Deans (2 - Engineering, A&S)
3. Chairmen (2 - sciences, social sciences)
4. CC Director
5. Faculty (2 - sciences, social sciences)
6. Students (4 or more)

Explain the purpose of the study and how you came to call on the coordinator. Say that you have a copy of the questionnaire completed late last Spring in our Study and that you are reading it to become more familiar with the college. Because of this, the interviews will not require more than 15 minutes. As further preparation, explain that there are 5 aspects of educational computing at the college which will be covered in the interviews:

- Historical campus perspectives
- Changes to date
- Degree of satisfaction by faculty and students
- The climate for change
- The role of ECMI

Much of your preparation will involve the coordinator at the campus. This person can be very helpful to you and make your presence on campus as unobtrusive as possible. Ask the coordinator to help arrange contingency plans in the event last minute changes arise. Confirm all plans by phone two days before travelling to the college.

Through the coordinator, arrange to get copies of the college catalogue of course offerings, and degree requirement catalogues (Engineering, Arts, Sciences, Humanities). It will be very useful to read through these as soon as you arrive. If time permits ask that they be mailed to you beforehand.

When it is possible to contact respondents directly for obtaining interviews and later confirming them, it is best to do this yourself rather than depending on the coordinator. In doing so, follow the suggestion given above for contacting the coordinator; explain how you came to call them, explain the Study, and explain the diverse interview sample and interview topics. Confirm your appointments with other calls at a later time. Remember the importance of scheduling and preparation.

UPON ARRIVAL AT THE CAMPUS

Call the coordinator and arrange a brief orientation meeting. You could be explaining the final schedule and the Study in more depth while the coordinator shows you around the campus. If the coordinator mentions changes in schedule use the time at the beginning of your visit to discuss alternatives.

If you did not receive literature about the campus beforehand, then get it very soon from the coordinator. Spend time reading the literature before your observation of the computer facility since it might help you understand the facility and its users.

Ask where remote interactive and/or batch terminals can be found and whether the buildings are locked after 6 PM. You will be asked to compose a "Facility Observation" about what is seen on trips around the campus, especially at the computer facility. More about this now.

WHILE AT THE CAMPUS

You are to conduct a Facility Observation of the Computer Center, if there is one, and write a descriptive report on what is seen. If there is not educational computing at a center but at other locations instead, then you should conduct the observation(s) there. The observations may take place between interviews when they are spaced widely apart, or afterwards. Allow sufficient time to develop a good descriptive (not a judgemental) report. Several visits to the facility(ies) is best for your report.

The Facility Observation report is a very important element in your visit, and it is half of the reason for your travelling to the site. Although they will be stressed later in the context of interview transcription, several considerations will be mentioned at this point.

Observer-Interviewer Guidelines

First, behave non-judgementally; do not come to conclusions for the Study. Rather, absorb what is seen and heard and transcribe it. It will be difficult to avoid reporting "...was not adequate", "...seemed to be poorly coordinated","The center is under-utilized..." and so forth. By avoiding judgements, you as an individual with your unique background and experience, will not represent sites differently than other observer-interviewers, and the Study can make greater use of its findings in cross-site comparisons.

Second, be unobtrusive. You are to make observations and conduct interviews, and should blend into the surroundings as much as possible. Don't act like an expert. Dress in clothes that match the prevailing dress on campus for those of your age, even if this is above or beneath your usual style.

Third, probe. This means you should use a line of questions stemming from a central question, or as often is the case, you should ask the same central question phrased in another way. When you feel a more complete answer is needed to a question, rephrase the question and continue your inquiry. At times it will be tempting to jump back to previous questions and ask for clarification after some new fact has come to light. Do not jump around. Save your questions and ask them at the completion of the interview. Often, it stimulates the respondant to expand a response if you say "That's interesting. Could you say something else about that?" Observation-interviewing techniques like these are called probes.

Finally, we must be able to read your observation report and interview results. Poor handwriting can be overcome by transcribing notes carefully. It is important to do this very soon after taking the original notes.

Topics For Observation

The Facility Observation report is aimed at the accessibility of the computer center to students and faculty for their courses and research work. Remember, the computer center at some colleges may be very modest. We are not limiting the observations to large centers. In cases where there are several "centers," you should observe them all, providing they are used for educational computing. To describe the facilities well you will probably have to question staff and users about what you see. Your descriptions should cover the following topics at a minimum:

- What computers, terminals, keypunches, etc are available?
- What operating systems and languages are available?
- What is the weekly operating schedule?
- Are there consultants or experts available for questions?
- How do students get accounts/passwords/IDs?
- Are budgeted accounts used for assigning charges for time?
- Is there an emphasis on serving faculty research rather than student coursework or research?
- Is remote or local student use the most popular?
- How typical is the use-pattern observed?
- How is the center organized, as a closed or open operation?
- Is the delivery of output well organized?
- How satisfied with turn-around are the users?
- Is there work-space for users to correct their runs?

Complete the Factility Observation report before leaving the campus. Your notes and impressions will be fresh in your mind at that time. In general, the report should be longer than one page, but there is no requirement to write an autobiography of your campus visit, either.

Your first and last contact on campus should be the coordinator. This person will undoubtedly deserve your thanks before leaving.

CONDUCTING INTERVIEWS

Arrive promptly at the scheduled interview time. Because you will have confirmed this time in advance, there is little chance that the schedule cannot be met by the respondants. Since the campuses will be unfamiliar to you, allow ample time for geting between appointments.

You may read, recite from memory or paraphrase the Introduction for the respondants (attached) after you have explained that some common questions people have about the Study are answered in that statement. Afterwards, answer any questions that might arise.

Assure the respondants that their information will be considered confidential. Individuals will not be singled out, no names will appear in our reports, and findings will be reported as aggregates. It is not necessary for you to write the respondant's name on the interview form. However, it is very important to indicate whether they are presidents, deans, chairmen, CC director, faculty or students, and to which departments they belong.

Read the questions as they appear on the Interview Form. When a question is inappropriate, skip it. Otherwise follow the pattern established for questions in the Form. Generally speaking, it is bad to paraphrase the questions, even though they may seem stiff or formal when read. Paraphrasing often leads to alteration in meaning or emphasis. Practice asking questions as they are written by looking in the mirror, or by asking a friend to listen. It is very important to be well prepared.

Probes are suggested for most questions. They appear in [brackets]. Use them after asking the main form of the question in cases where an answer might be expanded.

Don't try to record answers verbatim. Plan to transcribe your notes onto a clean Form later. You can expand your notes into comprehensible (and legible!) statements at that time.

For use during preparation, a copy of the interview questions and probes is attached to this Interviewer Kit. Space between questions which is present in the forms for field use has been omitted in the preparation copy. You will notice in reading the questions that no stock answer alternatives are provided, so you will not be able to check a box or fill in a blank. While this makes recording somewhat harder, it expands the kinds of answers we can receive.

At the end of the interviews take time to flip back through the questions as a double check for omissions. Thank the respondants for their time and mention that study findings will be available during 1980. The person serving as site coordinator will receive a copy of the report at the time it is published.

INTERVIEW QUESTIONS
FOR STUDY
BY INTERVIEWERS

INTRODUCTION

Thank you for taking time to see me today. The interview will take about 15 minutes, but before we begin let me briefly explain the purpose behind the study we're conducting. Approximately 250 institutions of higher learning serving predominately minority students have been identified as the target population of interest. Small samples that are regionally, ethnically and financially diverse have been selected for interviewing, while each of the 250 institutions has been asked to complete a detailed questionnaire reporting computer-use information. I have the questionnaire for ----- college name ----- here.

Our goal is to conduct a formal needs assessment of educational computing needs in these target institutions, with the ultimate aim of determining the level of educational computing resources that is consistent with enrollment levels and educational goals. The audience for our results will be the institutions themselves, and governmental funding sources as well. Models of success among the institutions studied will aid less successful institutions in improving their campus computing resources. Because these models will be described in our written reports, better information will be used to guide support for computing activities in the future.

Now, let's begin the interview. [Probes appear in brackets.]

HISTORICAL CAMPUS PERSPECTIVES

1. How long have you been at this institution? [Has your role changed during that time? Were you in a similar role somewhere else?]

2. When did a computing capability first become available here? [Have there been discussions about acquiring (more/any) capability?]

3. What was the purpose of that original equipment? [Was it used for administrative, instructional, research or several purposes? What was the relative emphasis among the several purposes?]

4. How was that equipment/computer time financed? [Were institutional or outside funds used?]

5. What persons or factors do you feel were most important in fostering the development of this initial capability? [Was there support or enthusiasm in limited or widespread parts of the campus? Were many aware of the new capability?]

CHANGE TO DATE

6. Please describe any interium changes in computing equipment or arrangements between the initial and present facilities? [What has happened since the original development of computing was fostered here?]

7. What persons or factors were important in producing these changes? [Why were the changes made?]

8. How were the changes handled financially? [Did the financial arrangements influence the type of changes that took place? Was there a decision to avoid certain avenues of financial support? Why?]

9. In general, what factors, persons or groups do you feel have been influential in shaping the current computing status of the institution? [Were there other forces or conditions, perhaps outside the campus, that could be considered influential?]

DEGREE OF CURRENT SATISFACTION (Non-student respondants)

10. How well do you feel the present user arrangements and computing facilities are meeting the instructional and research needs of the faculty? [Which needs are best/worst met now? How?]

11. Are there any aspects of the current situation which you feel are exemplary in terms of meeting the particular instructional and research needs of faculty through computing? [Do you know of faculty that feel differently? Why?]

12. Are there any aspects of the current situation which you feel are inadequate? [Are there cases like these where a noticable improvement has taken place? How did that happen?]

13. Do you have any ideas about changes which might result in more complete satisfaction of faculty computing needs? [Do you know of instances where such changes worked? Answer in terms of other institutions like yours as well.]

DEGREE OF CURRENT SATISFACTION (Students only)

14. How well do you feel the present user arrangements and computing facilities are meeting the coursework or research needs of the students? [Which needs are best/worst met now? How?]

15. Are there any aspects of the current situation which you feel are exemplary in terms of meeting the particular coursework and research needs of students through computing? [Do you know of students that feel differently? Why?]

16. Are there any aspects of the current situation which you feel are inadequate? [Are there cases like these where a noticable improvement has taken place? How did that happen?]

17. Do you have any ideas about changes which might result in more complete satisfaction of students` computing needs? [Do you know of instances where such changes worked? Answer in terms of other institutions like yours as well.]

THE CLIMATE FOR IMPROVEMENT

18. Do you feel there is a lack of awareness among students, faculty or administrators of the ways computers can be used in higher education; and is this a potentially serious factor in the development of institutional computing facilities? [If computer literacy is a negative factor, what levels seem to be the most/least sophisticated? What makes the difference?]

19. Would the institution be generally supportive of improving the computing capabilities? [How would the support be expressed? Who could help most?]

20. How would the improvements best be undertaken? [What pitfalls do you see around the campus for the improvements? How could they be overcome?]

21. Are you aware of any plans to upgrade computing equipment or to improve user arrangements in the near future? [What are these plans? Why were they initiated? By whom?]

22. Do you perceive any pressures operating internally that are likely to influence the future of computing arrangements here? [Are there external pressures? What are they?]

23. What factors, groups or individuals will be most important in shaping the future of computing here? [How will this be done?]

THE ROLE OF ECMI

24. You may know of someone here who has participated in an ECMI (Educational Computing in Minority Colleges consortium) educational conference. Who? [If doesn`t know of ECMI then ask about other educational computing conferences. Specify which conferences. If doesn`t know either, skip to question 28.]

25. What activities, if any, resulted from this participation? [Who benefited from such activities?]

26. What other results might be due to ECMI or other conferences? [Would the benefits of these conferences be different? Which would be the most beneficial? Why?]

27. Are you aware of any reasons behind the decision not to participate in ECMI or other conferences? [Separate answers for each conference type.]

28. Are you aware of any reasons behind the decision to participate in ECMI or other conferences? [Separate answers for each conference type.]

29. Would further participation be beneficial? How? [Separate answers for each conference type.]

APPENDIX G

OBJECTIVES

OBJECTIVES FOR EDUCATIONAL COMPUTING AT MINORITY INSTITUTIONS

HUGH POYNOR
POYNOR COMPUTER APPLICATIONS
7372 WEST 82 STREET
LOS ANGELES, CA 90045

OBJECTIVES FOR
EDUCATIONAL COMPUTING AT MINORITY INSTITUTIONS

Hugh Poynor
Poynor Computing Applications
6372 West 82 Street
Los Angeles, CA 90045

Goals for educational computing are rapidly expanding as computer sophistication of college faculty and administrators increases. Minority institutions of higher education are seeing insistence that hardware, software, courseware, and support staff become more available to serve widening higher education applications.

Indeed, computer science uses of computing resources -- that is, those applications for the study of computers and software *per se* -- represent only a portion of all use. The predominance of computer use is in serving student learning in the natural and social sciences, business, and other disciplines. The most sought-after college graduates of the 1980's, it now seems, will be those facile with computer use in their respective concentrations.

Besides expanding faculty and administrative computing goals and greatly broadened areas of computer applications, there is also the technological explosion of the computer's price/performance curve. Computers are becoming less expensive and more powerful at a staggering rate. Some even argue that the rate itself is undergoing a pronounced increase. With this cost effectiveness comes potential diversification of use in tandem with other burgeoning technologies (telecommunications, video disks, satellites, and cable television.)

While computing technology is germane to most institutions of higher education in general, it remains a problem to determine what must be done by any one institution to control the use of its funds so that minority education is served efficiently and in a manner appropriate to a broadening and accelerating technology. Our study of computing needs at minority institutions has surveyed hundreds and studied in depth a score of institutions with the purpose of identifying computing needs, identifying objectives which translate the needs into criteria, and finally of specifying strategies for meeting the established criteria. In conducting this research, we found that there seem to be no major pressures against improving educational computing at minority institutions, although a substantial percentage of institutions reported that external forces (primarily federal and state governments) are to some extent an impediment to computing growth. The road to expansion of academic computing capability would also obviously be smoother given large amounts of easily obtainable funds. The general picture which emerges, nevertheless, is one of a generally favorable climate for the expansion and broadening of academic computing at minority institutions.

The objectives outlined here, necessarily broadly stated to fit institutions with diverse capabilities and curricular emphases, are offered in service of an orderly and thoughtful progression towards increased academic computing capability and activity in minority institutions.

EDUCATIONAL COMPUTING OBJECTICES

Our first objective is of utmost importance to all of the minority institutions whether they have computers or not. Other objectives which follow are not sufficient by themselves, even though they are quite important after the first objective has been adopted. In this sense, they are subordinate objectives to the first.

1. Establish institutional computing goals and departmental objectives. Both academic and administrative (or all non-academic) requirements for computers should be clearly stated. These statements of requirements should be updated annually. Colleges must establish their positions with respect to all computing, and in so doing, must centralize the decision-making process which surrounds apportionment of computing resources. It is important that these statements be officially sanctioned at the highest administrative levels.

In our survey we found that 2/3 of the responding college presidents had a long-range plan for improvement of their computer services, while 2/3 of the responding deans reported that campus-wide groups had met to study the acquisition or improvement of computer capabilities for

for instructional purposes. Our first objective is aimed at all minority institutions, in the hope that goal-setting for educational computing will be bolstered because of our study, and more specifically at the one third who fail to plan or to gain widespread support.

Educational computing goals should be somewhat global and abstract, and they will undoubtedly differ greatly among colleges serving different populations with different course offerings. Goals should be projections, too, with annual evaluation milestones.

Departments and non-academic organizations within the institutions are the building blocks for this process. They should each specify more tangible and measurable objectives that feed into the institutional statement of requirements. A knowledgeable member of each department, with the aid of student representation and in consultation with computer facility representatives (when facilities exist) should compose educational computing objectives for the department in measurable terms that can be monitored. Annual review and updating of institutional goals shoud follow from the measurable objectives as stated, monitored, reviewed, and updated by the departments.

The central authority that is tasked with stating institutional requirements, as we are proposing, should have the additional task of encouraging departmental objectives that employ computing to its fullest, while discouraging, when necessary, any herculean objectives which might arise in overly-zealous departments. This same authority should be responsible for apportionment of resources among the departments and non-academic users as well. As such, this agent must be prepared to deal with the familiar conflict between academic and non-academic users over limited resources by formulating clear statements of institutional policies and priorities. At this juncture, in particular, the clear approval of the highest levels of the administration becomes important. Ideally, the interest as well as the authority of the high administrative levels should be aroused, and the administration should become involved in a productive dialogue regarding the apportionment of resources as well as the direction of the institution's computing future.

2. Gather baseline data and routinely collect standardized reports. By monitoring the identity of departmental users, the kinds of jobs run, and the frequency with which they are run, it is possible to register increases in utilization and shifts in use patterns. In addition to such mechanical data gathering, user evaluations should be carried out each semester.

Experientially, it seems to be true that those in command of relevant figures find it easier to acquire additional resources. The director of computer services who can report to the president that in the two months since the addition of four terminals there has been an increase of 50% in the number of students served weekly, clearly linking a hardware improvement to increased student usage, will certainly have a stronger argument for the purchase of a few more terminals or a faster CPU than the director who can say only that students seem to like the new additions and are probably using the computer more.

Such routinely-gathered data can also be used to inform decisions regarding questions of software acquisition, equipment relocation, or scheduling of services, and can be used in evaluation of particular equipment or service configurations. Routine data gathering, thus, can be extremely valuable in efforts to produce optimal designs for student work seeting.

While departments differ in the kinds of evaluations they might perform, all should support standardized reporting. Some useful divisions for reporting might be departmental affiliation, level of user (faculty, staff, student), memory requirements, input-output requirements, software system used, and time of day.

The purpose of such data gathering is to better inform decisions about institutional goals and progress made toward them. Questions of apportionment can sometimes be reduced to empirical questions by this means, although the matter of congruence with institutional goals remains a question to be considered under the rubric of our first objective.

3. Hire computer science faculty and train other faculty. Our training objectives concern only educational computing criteria, and unless otherwise stated, deal with training

for non-computer science faculty and students. In other words, in what follows we are mostly concerned with computers used in the course of studying and solving problems in disciplines other than computer science.

Mention of computer science should be made before leaving the topic behind, however, since confusion may arise between the study of computers (i.e., computer science) and the use of computers in studies (i.e., other academic concentrations).

In the minority institutions studied, trained computer science faculty were seriously underrepresented; that is, there were fewer faculty teaching computer science than we would expect when looking at the proportionate differences in enrollment levels between minority and non-minority institutions. Increasing the numbers of these faculty would provide more computer education, of course, and other faculty would probably use them as computer consultants in the pursuit of computer applications in their academic areas of interest. Thus, an objective within faculty training is acquisition of computer scientists to perform part of the training; an important step in closing the gap between minority institutions and non-minority institutions.

While there is reason for optimism regarding levels of computer literacy and facility, much still remains to be accomplished on minority campuses. Active recruiting of faculty skilled in computer applications is clearly desirable. The impact which such recruiting can have, however, will realistically be limited. The focal point for improving faculty computer literacy thereby logically falls to inservice training, or continuing education for the faculty.

Training of faculty for using computers in their courses could consist of direct training or instruction, referrals to training at centers and in workshop settings, and continuing newsletters or bulletins from the central computer facility used by the college. Part of the continuing education should take the form of libraries of reference materials.

The faculty training objective must be an articulate part of institutional goals, and training can have central as well as departmental components. In the latter case, faculty can take responsibility for training other faculty with whom they share an academic concentration.

Institutional goals, and the corresponding budget at that level, should state faculty training priorities vis-a-vis other faculty responsibilities to ensure that faculty training is not in competition with these other responsibilities.

The content of training is expected to be both computer-user oriented as well as content oriented when offered by departments. However, department user groups are also expected to have a considerable impact on the nature of the institutional-level training.

Training should include dissemination. It is suggested that the central computer facility or the administrative unit with that title take a vigorous role as librarian/custodian of documentation and software. Regular newsletters might be published mentioning new software as well as tips on using hardware and existing student packages efficiently.

While the faculty training objective is designed to increase effective computer use, it should also be pointed out that this training must teach the limits of the computer, from a cost viewpoint, in replacing conventional methods. Several problems will be repeated by newly enthusiastic faculty unless they have been warned against a particular unwise course of action. Chiefly, such problems tend to arise when faculty attempt too large a development effort and never bring it to fruition (a not unusual situation in CAI development, for example), or when more effort is put into development than into documentation and librarianship.

4. Train students. As indicated in the survey and in-depth site studies, many campuses will undoubtedly be increasing their computer science and other computer-related course offerings and majors in the next few years. This is obviously of great importance, and such expansions should be elaborated within the framework of the institutional goals.

Of possibly equal importance, however, is the need to improve the computer literacy of all students. In addition to providing computer-based instruction or requiring computer use in connection with course work in other disciplines, the institutions should have specific plans for providing all students, in whatever majors, with a perspective on the current and future role of computers in both life and work settings. Students should be made aware of the vast number of applications for the computer as a tool. This should incorporate a "future think" training component to sensitize students to projected, future trends, such as the probable roles of personal and home computers in the near future.

Such student training should begin with the simplest possible introduction to computing, out of the knowledge that many students are easily threatened or quickly become disinterested when faced with either highly abstract lectures on the inner workings of the computer, or the need to operate on machinery with insufficient prior preparation.

In terms of student training, then, the objective is not only to continue to provide an increased menu of computer-related course offerings and occasions to use the computer in coursework, but to provide minority students from all majors with a grounded perspective on the role of the computer as a general life tool.

5. Enhance computer service. Our final objective addresses an increase in educational computer services at minority institutions. We have chosen not to address hardware, software, and staff in isolation, since our investigations have suggested that these factors must work cooperatively to result in improvement of computer resources and their availability. For example, we found several instances where much less than optimal service was being provided, even though sufficient hardware existed. It should be stressed here that in an overall sense, staff deficiency is frequently a deterrent to effective service.

As the age of remote computing, distributed processing, intelligent terminals, and personal computers expands, the concept of a central hardware facility is less common, and the limitations of one particular item of hardware or another tend to blur, since many items may cooperatively provide institutional computer service, depending upon requirements for speed, input-output, and memory. The idea of "hardware" has proven troublesome at times of equipment purchase. Brand names and popular features often interfere with judgements about price or performance because requirements are not clear.

For these reasons, it is often helpful to think in terms of computer service rather than "hardware", particularly when non-computer science applications are concerned. It is also more useful to think and talk in terms of service requirements than hardware when specifying institutional computing objectives. Computer service is provided by hardware, of course, but also by staff. There must be operators to change tapes and disks, care for batch printers, and maintain the hardware. Software is actually more directly involved with the faculty and student users in giving computer service, since the logic of programs controls the computer's processes.

We have found that approximately the same percentage of minority and non-minority institutions have acquired computing equipment, but there are far fewer computer scientists at minority institutions. The imbalance between these factors should partly explain whey educational computing service has been found wanting at many of the institutions, as this in effect places the equipment out of the reach of faculty and students.

In many cases software resources present in minority institutions were not available except to a few insiders. Computer librarianship could learn much from the historical development of traditional library practices, and this is particularly true in emerging institutions whose computer service resources are in an early stage of development. Many seeming hardware limitations, and in some cases support staff limitations as well, can be remedied by many of the higher-level language systems how available. File management, data based inquiry, statistical analysis and so forth, has been raised to a level that make them tremendous tools to users -- in effect enhancing hardware performance.

We will not address the question of level of service, since that is the purpose of our primary and first objective. Computer service levels should be locally defined and developed by a widespread process, including the faculty and students, and even the administrative uses of computer services for which educational computing activities must inevitably complete.

SUMMARY

Five objectives arising from our study of minority institutions have been offered here in service of increased academic computing. These objectives are concerned with goal setting, evaluation, faculty and student training, and enhancing the level and quality of computer services available. Stated in perceived order of priority, the objectives have dealt with academic computing as embedded in the familiar milieu of competing administrative computing requirements, competing academic department needs, as well as within the somewhat unique context of the minority institution.

Pertinent to the goal setting, evaluation, and faculty training objectives in particular are our survey and on-site studies, where we seemed to see a trend toward successful hardware acquisition even in the face of relatively acute computer faculty shortages. We have found that successful educational computing depends heavily on the availability of computers with suitable software, and also upon the expertise, dedication, and enthusiasm of key faculty on campus.

INVESTIGATION OF THE EFFECTIVENESS OF A LEARNED HELPLESSNESS ALLEVIATION STRATEGY FOR LOW APTITUDE LEARNERS

Principal Investigator
John M. Keller
Syracuse University

CONTENTS

Learned Helplessness	1
Learned Helplessness and JOBS Trainees	2
Alleviation of Learned Helplessness	4
The Proposed Study	7
Method	8
Project Plan	11
Personnel	13
References	15
Cost Proposal	17
Appendix A: Vita	

TECHNICAL PROPOSAL

Past research on influences on poor learning performance suggests that the phenomenon of learned helplessness (Seligman, 1975) may account for a significant degree of failure by low aptitude students (Dweck, 1975; Chapin & Dyck, 1976). However, this research has not yet led to practical, easily implementable instructional strategies that will help alleviate the problem (Thomas, 1979). The purpose of this proposed research is to test an instructional design strategy that would help eliminate the interference effect of learned helplessness on the acquisition of basic skills by low aptitude personnel. Furthermore, this study will examine the feasibility of the alleviation strategy for use by typical classroom instructors.

Learned Helplessness

Learned helplessness is a condition in which a person has a desire to succeed, has enough ability to succeed, yet continues to fail. To understand this phenomenon, and how it can lead to lowered measured ability even though it is basically a motivational problem, it is necessary to trace its development. Learned helplessness develops when a organism, a person or an animal, is subjected repeatedly to situations where it is motivated to succeed, but is in fact helpless. Once the perception of helplessness is established, it persists into situations where success is possible.

For example, in some frequently cited experiments, dogs were strapped into harnesses and shocked repeatedly. They would jump and jerk in the harness as much as possible. However, after several trials, they would quit trying and lay limp in the harness. Thus, initially they were highly motivated to escape, but they could neither avoid the situation nor escape from it. Later, they were placed in a shuttlebox, which is a a box with a wire grid on the bottom and a barrier across the middle. When shocked, they leapt into the air, and many of them stumbled over the barrier and escaped the shock. However, despite their success in escaping, they gave up after two or three trials and lay limply on the grid whenever the electricity was on. This was in sharp contrast to naive dogs that had not had the helpless experience in the harness. The naive dogs would, after having discovered the means of escape, continue to escape immediately at the onset of the electric current. They also learned to avoid being shocked when a light or audible tone preceded the current.

Learned helplessness was explained as a perception of non-contingency by the organism. That is, the organism behaved as though it "saw" no connection between its behavior and the consequences. The "helpless" dogs failed to learn the appropriate escape behavior in the shuttlebox even though they successfully escaped at first. Having to face the challenge repeatedly resulted in the same helpless behavior that had been established in the harness. In other words, learned helplessness is a condition in which the organism presumably fails to perceive any connection between its actions, or the degree of effort exerted, and its subsequent success or failure at a task.

In subsequent studies with humans, it was demonstrated that learned helplessness could be established by cognitive problem-solving tasks as well as physically aversive tasks (Hiroto & Seligman, 1975), and by verbal instructions as well as environmental contingencies (Keller, 1974). Furthermore, Dweck (1975) extended the concept from the laboratory induced demonstrations to the identification of children in a school who could be characterized as having a learned helpless attitude toward math. The salient characteristics of these children were that they wanted to succeed, but were working below their ability level. They would persist in their work as long as the problems were easy, but would give up when faced with a challenge that threatened failure.

Learned Helplessness and JOBS Trainees

JOBS Trainees may, in large measure, have a degree of learned helplessness that interferes with their ability to learn. Students with measured low ability typically have a pattern of school failure that begins at an early age and continues unremittingly until the student either drops out, graduates, or is kicked out of school. Paulo (1962), for example, found that reading problems tend to originate in the first grade and continue without significant remission from that point forward. They tend never to catch up with their peers even though most of the causes of early reading failure tend to dissipate over time. Loiacono (1977) found that children tend to occupy the same relative achievement level throughout elementary school. The children at the bottom stay there; there is very little movement up or down in relation to their peers. Thus, failure is a consistant presence for many low ability children. Failure, in the sense that it is being used here, means that a student is so far below the average for his or her peer group that he or she has a constant sense of failure, especially in basic school subjects such as math and reading.

These conditions would tend to generate a learned helpless attitude in the children who have the lowest aptitude, or other reasons for low relative achievement, in the early years of school. This helpless attitude could be expected to remain even though the original problems dissipated, and it could develop as an additional barrier to learning in children who continued to have learning difficulties. This has been documented in studies that have shown that chronically deficient students are typically slow in persistence and effort, and are often unwilling to attempt tasks even if they are appropriate to the students ability (Bluestein, 1967; Sabatino, 1976).

The trainees in the JOBS program would seem to have these characteristics. They are low aptitude persons who typically have a sense of failure in regard to school-related subjects such as math and reading. Furthermore, it is difficult to distinguish between a lack of native ability versus years of low achievement and failure as causes of low measured ability. One way to test the assumption of a learned helplessness factor among these trainees would be to subject them to an instructional strategy designed to alleviate learned helplessness. If such a treatment were successful, it would support the inference as to the presence of a learned helpless condition among these learners, and it would offer a solution to the problem. The following discussion is specifically concerned with alleviation strategies, and leads directly to the research questions of this study.

Alleviation of Learned Helplessness

Once established, learned helplessness has been shown to be highly resistant to alleviation (Overmier & Seligman, 1967). Recent efforts have been successful (Chapin & Dyck, 1976; Dweck, 1975) but have not yet resulted in practical, easily implementable strategies. However, one recent attempt (Murphy, 1980) is promising and will be used as a basis for the present study.

Two studies will be reviewed in this section. Dweck (1975) established a paradigm for approaches to alleviating learned helplessness in math, and Murphy (1980) extended it to make it more practical and to apply to learned helplessness in reading. Dweck (1975) demonstrated that a treatment to alleviate learned helplessness among chronically deficient math students had to have both a cognitive and a behavioral component. A comparison treatment that used a traditional behavior modification approach, incorporating high rates of success with positive reinforcement was not successful. These children continued working as long as they were successful, but gave up quickly when faced with the likelihood of failure; i.e., when they were given unfamiliar or slightly more difficult problems.

Following the initial conditioning process, the helpless person does not perceive a contingent relationship between success, when it occurs, and a given response on his/her part. Therefore, ordinary behavior modification approaches would have little effect on alleviating the problem because they depend on the assumption that behavior is controlled by the actual contingencies in a given situation.

Consequently, learned helpless alleviation has focused on the reestablishment of a perceived contingency between the response of the organism and the outcomes of the response. Dweck's (1975) primary treatment contained a cognitive "reattribution" component. Children in this treatment were provided with a series of success trials interspersed with trials that initially resulted in failure. However, with the experimenter's encouragement to keep trying the children were able to succeed, and the experimenter helped them attribute success to their own effort and ability. On a post test, these children continued in their efforts despite an occasional failure.

Dweck's (1975) study was significant in that it established a basic paradigm for an alleviation strategy. However, the utility of the study was limited in that it was conducted under highly controlled conditions with a subject matter that was carefully structured for each student. Murphy (1980), who worked under the supervision of the principal investigator of the present proposal, designed a more generalizable strategy. He tested an approach with children who were two or more years behind their grade level in reading, and he conducted the test in a regular remedial classroom setting. The treatment developed by Murphy (1980) was modeled after Dweck (1975) in that it included task conditions that would insure success only if the student exerted sufficient effort, and it included an attributional element. The experimenter explicitly told the student that the observed successes were due to the student's efforts. However, in contrast to Dweck there were some important differences corresponding to the different types of settings, and presumed differences in the conditions surrounding the reading deficient versus the math deficient child.

When working with students over a protracted period of time in a naturalistic setting, failure experiences in reading cannot be controlled outside the classroom between treatments. For adolescent reading deficient readers, reading failure is a prominent and ever-present phenomenon. From the box of breakfast cereal to the credits in the late night movie, opportunities for reading failure abound. It is nearly impossible for reading instruction to occur with these students without the student failing to be able to read some words in context.

Therefore, an effort was made by Murphy to help students associate improvement on specific tasks with generalized improvement in reading. The students were pretested on a word recognition test, required to complete a series of reading skills development tasks, and retested on the word recognition test. This process was repeated weekly for six weeks. This process allowed students to see the consequences of their effort in terms of an improved general reading ability score, and the experimenter attributed the improvement to the effort exerted by the student.

Murphy (1980) found a strong effect for the alleviation treatement on improvements in measured ability on the dependent measures of word recognition and comprehension. However, despite the positive results, there were some conditions that limit the generalizability of the study. The sample was small and the socio-economic status (S.E.S.) was middle to upper class. Theoretically, this approach should also work with lower S.E.S. students, but this generalization can not be made without further testing, especially since even poor readers in high S.E.S. homes are likely to grow up with more exposure to books and people who spend time reading. This has implications for the present study as described in the following section.

The Proposed Study

The proposed study will be patterned after Dweck (1975) and, to an even greater extent, after Murphy (1980). The specific purpose of the present study is to test the effectiveness of an instructional management strategy on the alleviation of learned helplessness in the basic job skill areas of math and reading. Murphy's arguments concerning the pervasiveness of the sense of failure in the life of the low reading ability student will be extended to include low ability math students as well. A treatment designed to improve the general level of performance and measured ability in math and reading will be tested.

As previously suggested, this predition is based in part on the assumption that the true ability of many if not most of these trainees is higher than their measured ability. This discrepency has resulted in part from the development of a learned helpless attitude which results in low expectancy for success. This becomes a self-fulfilling prophecy for these students who continue to fail despite the fact that they may at times have a real desire to succeed. This is not a contradictory position, and is easily explained by expectancy-value theory (Keller, 1979; Porter & Lawler, 1968; Rotter, 1972). Briefly stated, expectancy-value theory postulates that motivation is a function of what a person desires (the value component), and the person's subjective expectancy of success. This is probably a multiplication function which means that if either value is at or near zero, it makes little difference how strong the other value is. The learned helpless student may evidence strong desire, but the nearly zero expectancy for success contributes to a continued failure experience.

It is possible to alleviate the learned helpless condition with carefully designed instruction that is within the capability of the student and is coupled with personal feedback that helps the student learn to attribute success to his or her ability and effort rather than to luck or ease of task (see Weiner, 1974, for an elaboration of attribution theory). This sometimes happens fortuitously due to the quality of instructional design and the intuitive behavior of an instructor. The present study is designed to test a strategy that will help instructors systematically reduce the helpless component.

Specifically, the major research question addressed by this study is whether an instructional management strategy that combines success enhancement and personal attribution factors will result in significant improvements in measured basic skill abilities and course performance. To test this strategy, it will be administered by regular instructors under the supervison of the principal investigator and his research associate. To test the feasibility of the method for general application, and to test its stability, the method will be implemented a second time under unsupervised conditions.

Method

Subjects. This study would require approximately 240 subjects. The first 120 trainees would be used for limited amounts of time during a period of approximately four to six weeks. Each week would include a period of testing, and periods of instruction and self-study in the basic skill area. The second 120 would be used for a replication under unsupervised conditions. The design and treatment descriptions apply to both the supervised and unsupervised groups.

Design. Trainees would be assigned to one of two groups. the math improvement or the reading improvement group. Each of these groups would be subdivided into three treatment groups: (1) success enhancement plus personal attribution, (2) success enhancement only, and (3) instruction only. Conseuqently, the basic design is a 2 X 3 analysis of covariance with two covariates. Prior ability is the covariate for the dependent measure of ability, and prior expectacny for success is the dependent measure of expectancy for success. Course achievement is a third dependent measure.

Treatments. The primary treatment group is the success enhancement, personal attribution group (T1). This group will be divided into math and reading subgroups, but otherwise will take a pretest of ability and expectancy for success. The ability measure will be one which can be reused periodically for retesting, and for feedback since these are important elements of the alleviation strategy. The two key elements in this strategy are to provide convincing evidence of substantial improvement to the trainees, and to convince them that their improvement was due to their own efforts.

The attempt to accomplish the first element is provided by an artifact of testing that can be used to the student's benefit. Students will be given detailed feedback on their performance on the ability pretest. They will be shown the incorrect items and the correct responses. Then, during the following week, they will be given a series of regular assignments in the given subject area. They will be told that if they work hard and complete these assignments, they will be allowed to take the ability test again, and that they will be guaranteed to see improvement. A critical element in this process is to ensure that the students complete the assignments and that they want to be retested. This is necessary for the students to believe that improvement are due to their own efforts. Students who do not comply are not allowed to take the performance test. When students are retested in one week on the same ability test, especially after having received feedback on missed items, the probability of noticeable improvement is extremely high, and was found consistently by Murphy (1980) in his pilot testing and formal testing.

When students are given the results of their second test, they are also given reattribution feedback. That is, the instructors make specific comments that relate the improvement to individual effort and improved ability. After this first retest, students are told that they can continue to expect improvement, but not as dramatic as the first week. At the end of the sixth week, students are given an unfamiliar ability test to obtain an unbiased measure of growth. The prediction is that this measure will show significant improvement, although not to the extent obtained in the test-retest sequence. Students are then given additional feedback which supports their confidence in their personal growth. This procedure is expected to improve the students "test wiseness," and to reduce their helpless attitude so that they perform better on the relevant ability test. At the same time, it is expected that the motivational effect of the first week's experience will lead to increased effort and real growth in knowledge and skill.

The second group will be a modified success enhancement group (T2) that is designed to test the criticality of the attribution therapy component.

In this treatment, the group will receive the same instruction and feedback, although it will be written rather than oral. This is because all attributional feedback has been removed from this treatment, and the written feedback will be used to reduce the likelihood of experimenter bias.

The third treatment group (T3) is the no feedback, control group. This group will recieve the same instruction, and same series of tests, but will receive no feedback on the results of the retesting of ability. They will, however, receive normal feedback on performance in the instructional portion of the treatment.

Procedure. The specific procedure for this study can not be completed without additional knowledge of the conditions and content of instruction in the JOBS program. The general procedure of the study is contained in the following section.

Project Plan

The following plan is designed to last eight months; however, this could be revised if necessary. The present plan includes two administrations of a five week treatment. The second treatment serves a practical function rather than a theoretical one, so it could be eliminated if the duration of the project needs to be shortened.

Completion Date of Contract (DAC)	Task
7 DAC	ORIENTATION (1 week; May 1-8) The principal investigator (P.I.) will travel to San Diego for orientation to the staff, the curriculum, the trainees, and the training conditions. The P.I. will select appropriate instructional materials for adaptation and use in this study.

14 DAC FINAL DESIGN (1 week; May 8-15)

The P.I. and research associate (R.A.) will complete the design of the study and submit it to the C.O.

35 DAC DEVELOPMENT MATERIALS AND PROCEDURES (3 weeks; May 15-June 5)

The P.I. and R.A. will develop the appropriate sequencing for the instructional materials, the instructions for the experimental treatments, the management guidelines for the instructors who will implement the treatment, and the measurement procedures.

42 DAC DEVELOPMENT TEST (1 week; June 5-12)

The P.I. and R.A. will conduct an abbreviated try-out of the materials and procedures to identify errors and ambiguties. For economy, this testing will be conducted in Syracuse with learners who have profiles similar to the JOBS Trainees. The testing could be conducted in San Diego but has not been budgeted in the present proposal.

56 DAC REVIEW (2 weeks; June 12-26)

The experimental package, including the procedure and all materials will be submitted to the COTR for review.

80 DAC REVISION AND PRODUCTION (3½ weeks; June 26-July 21)

Feedback obtained from the developmental testing and from the COTR will be incorporated, and 150 copies of the materials will be prepared for the supervised study.

129 DAC CONDUCT SUPERVISED STUDY (5½ weeks; July 21-August 28)

The P.I. and R.A. will travel to San Diego to train the participating instructors, and to assist with initial testing and feedback sessions. The R.A. will then return to Syracuse, and the P.I. will remain in San Diego to supervise all elements of the study. This supervision is particularly important since it is both a test of the hypotheses, and of the feasibility of the approach for implementation by regular classroom instructors. The P.I. will ensure that the procedures are implemented properly, and will conduct a formative evaluation of the process. This information will be used informally in conjunction with the analysis of results, and as a basis for identifying revisions that might be needed for the unsupervised phase of the study.

150 DAC PRELIMINARY ANALYSIS (3 weeks; August 28-September 18)

Data from this phase of the study will be analysed, and a preliminary report sent to the COTR. Materials will be revised if necessary, and copies made for the replication.

185 DAC UNSUPERVISED REPLICATION (5 weeks; September 18-October 30)

The P.I. will travel to San Diego for five days to conduct staff preparation, and to complete the arrangements for the unsupervised replication of the study. At the conclusion of this replication, instructors will ship their records to the P.I.

206 DAC FINAL ANALYSIS OF RESULTS (3 weeks; October 30-November 27)

The P.I. and R.A. will analyze the results of the entire study.

240 DAC FINAL REPORT (4½ weeks; November 27-December 31)

The P.I. and R.A. will prepare and submit the final report.

PERSONNEL

Principal Investigator. The principal investigator, John Keller, is an associate professor in the Instructional Design, Development, and Evaluation Program of Syracuse University. Dr. Keller's published work includes research studies (e.g., Keller, Goldman, & Sutterer, 1978; Keller & Pugh, 1976) and theoretical papers (e.g., Keller, 1979, 1981) on motivation and instructional design. In conjunction with the graudate research program that he developed on motivation and instruction, Dr. Keller has directed seven dissertations on motivation. Three of these have focused on learned helplessness, as did his own dissertation research (Keller, 1974). In addition to this research experience, Dr. Keller has extensive experience in managing projects in various aspects of instructional technology including task analysis, instructional design, and evaluation. A complete vita is attached.

Research Associate. The research associate will be one of Dr. Keller's advanced level graduate students who has experience in designing and conducting research. Several students are qualified, and the one to be chosen will be based on degree of interest and availability.

REFERENCES

Blustein, V.W. Factors related to and predictive of improvement in the schools. Psychology in the Schools, 1967, 4, 272-276.

Chapin, M., & Dyck, G. Persistence in children's reading behavior as a function of N length and attribution retraining. Journal of Abnormal Psychology, 1976, 85, 511-515.

Dweck, C.S. The role of expectations and attributions in the alleviation of learned helplessness. Journal of Personality and Social Psychology, 1975, 31, 647-685.

Hiroto, D.S., & Seligman, M.E.P. Generality of learned helplessness in men. Journal of Personality and Social Psychology, 1975, 31,311-327.

Keller, J.M. Effects of instructions and reinforcement contingencies in the development of learned helplessness. Unpublished doctoral disdertation, Indiana University, 1974.

Keller, J.M. Motivation and instructional design: A theoretical perspective. Journal of Instructional Development, 1979, 2(4), 26-34.

Keller, J.M. Motivational design of instruction. Invited address at the annual meeting of the Association for Educational Communications and Technology, April, 1981, and to be published as a chapter in a forthcoming book.

Keller, Goldman, & Sutterer. Locus of control in relation to academic attitudes and performance in PSI course. Journal of Educational Psychology, 1978, 70, 414-421.

Keller, J.M., & Pugh, R.C. Sex similarities and differences in locus of control in relations to academic adjustment measures. Measurement and Evaluation in Guidance, 1976, 9(3), 1[illegible]18.

Loiacono, R. Differential Response patterns of achievers and non-achievers as a function of locus of control. Unpublished doctoral dissertation. Syracuse University, 1977

Murphy, F. Effect of a learned helpless alleviation strategy on reading performance. Unpublished doctoral dissertation, Syracuse University 1980.

Overmier, J.B., & Seligmen, M.E.P. Effects of inescapable shock upon subsequent escape and avoidance behavior. Journal of Comparative and Physiological Psychology, 1967, 63, 23-33.

Paulo, W.E. Improving reading in junior high schools in J.A. figurel (ed.) challenge and experiment in reading. Proceedings of the International Reading Association. 1962, 7, 164-166.

Sabatino, D.A. (ed.) Learning Disabilities Handbook: A Technical Guide to Program Development. DeKalb, IL.: Northern Illinois University Press, 1976.

Seligman, M.E. Helplessness. San Francisco: Freeman, 1975.

Thomas, A. Learned helplessness and expectacny factors: Implications for research in learning disabilities. Review of Educational Research, 1979, 49, 208-221.

Weiner, B. Schievement motivation as conceptualized by an attribution theorist. In B. Weiner (ed.) Achievement Motivation and Attribution Theory. Morristown, NJ.: General Learning Press, 1974.

RESUME OF:

John M. Keller

10/15/79

HOME ADDRESS:

126 Circle Road
Syracuse, New York 13210
(315) 424-1190

OFFICE ADDRESS:

Instructional Design,
Development & Evaluation
116 Huntington Hall
Syracuse University
Syracuse, New York 13210
(315) 423-3704

PERSONAL:

Born March 5, 1938; Married; Three children

ACADEMIC BACKGROUND:

Ph.D. Degree (1974)	Indiana University, Bloomington, Indiana 1. Major: Instructional Systems Technology 2. Minors: Research and Evaluation Organizational Behavior
B.A. Degree (1965)	University of California, Riverside, California 1. Major: Philosophy 2. Minor: English

EXPERIENCE:

Associate Professor, Syracuse University, Department of Instructional Design, Development, & Evaluation, School of Education, Syracuse University (July, 1979).

Deputy Director, University Consortium for Instructional Development and Technology, a consortium of six University programs in educational technology, Donald P. Ely, Director, 1979.

Associate Director, A Program of Training and Development in Instructional Technology for the Government of Indonesia. A project funded jointly by the Government of Indonesia and USAID (1977-1979).

Director, Doctoral Fellowship Program in Instructional Technology for Experienced Educators of the Deaf: A project funded by the Bureau of Educationally Handicapped (1975-1979).

Assistant Professor, Syracuse University, Area of Instructional Technology. Supervise graduate theses, teach courses in learning research, instructional development and evaluation (1974-1979).

NDEA Title IV Fellow in Instructional Systems Technology, and Graduate Research Assistant in the Division of Development and Special Projects, Indiana University (1971-1974).

Secondary School Teacher in the English and Social Studies Departments at the Grossmont Union High School District, LaMesa, California, and the Moreno Valley Unified School District, Sunneymead, California (1965-1971).

Department Manager, J.C. Penney, Co., Riverside, California with responsibilities for personnel supervision, merchandise planning and control (1961-1965).

Training Devices Specialist, U.S. Marine Corps with primary responsibilities for pilot instruction and equipment maintenance on mobile, operational flight simulators (1957-1961).

RECENT AND CURRENT CONSULTANTSHIPS:

Carrier International, Syracuse, New York. Development of programmed instructional materials.

U.S. Army Engineer School, Fort Belvoir, Virginia. Development and validation of an occupational training performance evaluation manual (Soldier's Manual) for the Engineer Equipment Repairman occupational specialty.

Upstate Medical Center, Syracuse, New York. Design and validation of a performance evaluation strategy for medical students in the area of diagnosis training. With Herbert Schneiderman, M.D..

Kendall Demonstration School for the Deaf, Washington, D.C.. Personnel performance and evaluation consultant.

U.S. Army Engineer School, Fort Belvoir, Virginia. Design and validation of a task analysis and performance evaluation tests for the Engineer Equipment Repairman occupational specialty.

National Science Foundation, Washington, D.C.. Evaluation consultant on proposal review panels for the program of Comprehensive Assistance to Undergraduate Science Education (CAUSE).

Development and Evaluation Associates, Inc., Syracuse, New York. Project design and management consultant.

Litton-Mellonics, Inc., Washington, D.C., and Columbus, Georgia. Training development consultant.

Singer-Link Corporation, Binghamton, New York. Assisted in the preparation of a proposal to design and develop a training device and training system for the XM-7 tank.

Agency for Educational Technology, Jakarta, Indonesia. Evaluation design consultant to the national open junior high school project, and national educational radio project.

Association for Educational Communications and Technology, Washington, D.C.. Evaluation of a plan for competency-based certification of media specialists.

Defense Language Institute, Monteray, California. Evaluation and statistical design consultant to the language development project managed by Development & Evaluation Associates, Syracuse, New York.

Westhill Central School District, Syracuse, New York. Continuing supervision and assistance to teachers in a Title IV-C Project to develop models of teaching based on curiosity and problem solving.

South Jefferson Central School, Adams, New York. Assistance in design and evaluation in the TItle IV-C project to develop models of teaching for individualization.

TRAINING PROJECTS:

Development of a Training Development Managers Guidebook for the Training Extension Courses, Army Training Support Center, Fort Eustes, Virginia, in collaboration with Litton-Mellonics, Inc. for Army Research Institute, Fort Benning, Georgia, 1977.

Motivating Human Performance. Preconference workshop presented at the annual meeting of the National Society for Performance and Instruction, San Francisco, March, 1978.

Motivation and Management. A three day workshop for academic and staff managers conducted at the Teachers College, Jakarta, Java, Indonesia, September, 1978.

How Do I Motivate My Kids? A one day workshop conducted by myself and six graduate students for the entire staff of the LaFayette School District, LaFayette, New York, March, 1979.

Developing Achievement Motivation. A three-part workshop for elementary and secondary teachers of Central New York, sponsored by the School Services Division, Syracuse University, March, 1979.

Motivation and Instruction. One day workshop for a staff development institute, Lincoln University, Pennsylvania, April, 1979.

Stimulating Curiosity and Problem Solving. A workshop conducted at intervals over an eight week period with elementary and secondary teachers to design, develop, and validate models of teaching. Westhill Central School District, Syracuse, New York, May-July, 1979.

Alleviating Learned Helplessness. A five day training workshop for six elementary and middle school teachers with continuing supervision to design, implement, and validate procedures to overcome helpless attitudes in children, Onondaga Hill Middle School, Syracuse, New York, August and fall semester, 1979.

Human Dynamics, Time Management, and Motivation. A two part workshop-seminar conducted for the Institute on Financial Management for International Executives, sponsored by the International Management Development Department, Syracuse University, September-October, 1979.

HONORS:

NDEA Title IV Fellowship, School of Education, Division of Instructional Systems Technology, Indiana University, Bloomington, Indiana, 1971-1974.

Outstanding Young Researcher Award, Association for Educational Communications and Technology, April, 1975.

Summer Research Grant, awarded jointly by the University Office of Research and Graduate Affairs, and the School of Education, Syracuse University, 1979.

Invited Speaker, First General Session of the Research and Theory Division, Association for Educational Communications & Technology, Denver Colorado, April, 1980.

MEMBERSHIPS:

American Educational Research Association
Association for Educational Communications and Technology
National Society for Performance and Instruction

PROFESSIONAL SERVICE:

Board of Directors, American Diabetes Association, Upstate New York Chapter, Syracuse, New York, 1977-1978.

Board of Directors, Research and Theory Division, Association for Educational Communications and Technology, 1977-1980.

Chairperson, "Studies of Motivation in Relation to Academic Adjustment and Performance: A Symposium." A paper session at the annual meeting of the Eastern Educational Research Association, Williamsburg, Virginia, 1978.

Chairperson, "Research with Young Learners." A paper session at the annual meeting of the Association for Educational Communications and Technology, Kansas City, April, 1978.

Council Delegate, Association for Educational Communications and Technology, Kansas City, April, 1978.

Guest Editor, NSPI Journal, July, 1978. Feature articles were concerned with motivation and training.

Chairperson, "Lessons Learned: Outcomes of Large Scale Projects." A session presented at the annual meeting of the Association for Educational Communications and Technology, New Orleans, March, 1979.

Chairperson, "Motivation and Instructional Design." A session presented at the annual meeting of the Association for Educational Communications and Technology, New Orleans, 1979.

Editorial Board, Exchange, a Central New York journal of educational innovations for elementary and secondary teachers and administrators, published by Westhill Central School District, Syracuse, New York, Dr. Scott Shablak, Editor.

PUBLICATIONS:

Educational planning and technology for educators of the deaf: ET/C. Newsletter, National Society for Educators of the Deaf, Spring, 1976. With A. Root.

Sex similarities and differences in locus of control in relations to academic adjustment measures. Measurement and Evaluation in Guidance, 1976, 9(3), 110-118. With R.C. Pugh.

A case study: Developing convergent formative evaluation. Journal of Instructional Development, 1977, 1(1), 31-35. With T.M. Schwen.

TEC (Training Extension Course) Managers Guidebook. Army Research Institute, Fort Benning, Georgia, October, 1978. With H.H. Setzler, and R. Smillie.

Developing an objective measure of academic motivation. Educational Technology, 1978, 18(6), 26-30. With D. Spitzer.

Locus of control in relation to academic attitudes and performance in PSI course. Journal of Educational Psychology, 1978, 70, 414-421.

Motivational needs game. National Society for Performance and Instruction (NSPI) Journal, 1978, 17(6), 3-4.

An adaptation of Edwards personal preference schedule. Psychological Studies, 1978, 23, 75-82. With S. Ullagaddi, and A.S. Dharanendraiah.

A practitioners guide to concepts and measures of motivation. Syracuse, New York: ERIC Clearinghouse on Information Resources, 1978.

Relationship between psychosocial maturity and performance in a self-paced course. Psychological Reports, 1979, 44, 88-90. With J.A. Goldman, and J.R. Sutterer.

Motivation and instructional design: A theoretical perspective. Journal of Instructional Development, 1979, 2(4), 26-34.

PAPERS:

Formative evaluation of the development of a human geography course. Paper presented at the annual meeting, Association for Educational Communications and Technology, Atlantic City, New Jersey, March, 1974. With T. Schwen.

Comparison of sex similarities and differences in locus of control in relation to the Omnibus Personality Inventory. Paper presented at the annual meeting, American Educational Research Association, Chicago, April, 1974.

Determinants of learned helplessness in problem solving. Invited address at the annual meeting, Association for Educational Communications and Technology, Dallas, April, 1975.

Teaching instructional development. Paper presented at the annual meeting, Association for Educational Communications and Technology, Miami Beach, April, 1977. With P. Doughty.

A performance and personality based validity study of the Survey of Study Habits and Attitudes. Accepted for presentation at the annual meeting of the Eastern Educational Association, Williamsburg, Virginia, March, 1978.

Locus of control, course achievement, and student ratings. Paper presented at the annual meeting, American Educational Research Association, Toronto, April, 1978. With T. Coleman.

Locus of control, study habits and attitudes, and academic performance. Paper presented at the annual meeting, American Educational Research Association, Toronto, April, 1978. With J.A. Coldman and J.R. Sutterer.

A theoretical perspective on motivation and instructional design. Paper presented at the annual meeting, Association for Educational Communications and Technology, New Orleans, 1979.

Lessons learned from large scale instructional development projects. Symposium presented at the annual meeting, Association for Educational Communications and Technology, New Orleans, March, 1979.

Motivation, learners, and instructional technology: An approach to encouraging research in instructional development. Paper presented at the annual meeting, Association for Educational Communications and Technology, New Orleans, March, 1979.

Theory and research on a model of the motivational design of instruction. Paper to be presented at the annual meeting, Association for Educational Communications and Technology, Denver, Colorado, April, 1980.